

THE
BRITISH PALLADIUM:
OR,
Annual Miscellany
OF LITERATURE and SCIENCE:
For the YEAR 1771.

The *First Part* consisting of *New and Select SUBJECTS*, of general Utility.

The *Second Part* containing *Answers* to the former Year's *useful Enquiries*; with *new and curious Enquiries* proposed for the present YEAR.

For the Use of Gentlemen and Ladies, Youth at School, and Navigators.
Serving both for Land and Sea.

The *Twenty-third* Number published.

With which may be had, *The Seaman's Guide to the Longitude*, or *Key to the Nautical Ephemeris*, just published.

By the AUTHOR of the *Improved ROYAL ASTRONOMER AND NAVIGATOR*.



"O while, along the Stream of Time, thy Name

"Expanded flies, and gathers all its Fame;

"Say, shall my little Bark attendant sail,

"Pursue the Triumph, and partake the Gale!"

Auctor ad Amicum eruditum Emersonum.

LONDON:

Printed for D. STEEL, Bookseller, on *Little-Tower-Hill*.

MDCCCLXXI. Price One Shilling.

P R E F A C E.

WE hope to be excused for farther observing, that if the present *Nautical Ephemeris* (consisting of numerous astronomical Materials, useless at Sea) were suited to *practical* Navigation, by publishing the two Subjects in *separate* Works, it would save the *Navigator* Expence, and be better received by him and the Astronomer at Land, while it would answer the Ends of both.

The Eclipses of the *Circumjovials*, for *Greenwich*, now published in the *Nautical Work* for 1771, as if they were to be used at Sea for the Longitude, and also the Tables computed by *Wargentin*, Secretary to the Academy at *Stockholm*, for calculating the Eclipses of the *third* Satellite, and other astronomical Redundancies, augmenting the Price of the Work one Shilling to the *Navigator*, (besides the Price of another Work to apply the former), who is obliged by his Employ in the *Navy* to be a Purchaser, is no more suited to his Purpose, than if all *Mayer's* last lunar Tables (sometime published by *Mr. Nourse* in the Strand, still said by *Mr. Maskelyne* as before, for five Years together, to be published **SHORTLY**) were published in the said Work. What appears the more extraordinary is, that *Mr. Maskelyne*, Conductor-General of the lunar Longitude-Scheme, should publish, in a Work designed to promote that Scheme, the Eclipses of the Satellites of *Jupiter*; who rejected the Use of the *Marine-Chair*, and all Attempts for observing the said Eclipses at Sea, as vain and entirely fruitless for determining the Ship's Longitude.

And we farther wonder at the Tables, annexed by *Mr. Maskelyne* to the *Nautical Ephemeris* for 1771; another Cause of augmenting the Expence of that Work, though with Propriety, could those Tables be found useful. But while *Mr. Maskelyne* tells us, at the End of his CAUTIONS, concerning the Use of those Tables, (*Naut. Eph.* 1771, last Page), that the "Latitude computed will be at least five Times nearer the Truth than the Latitude by Account, and therefore the Error of the Latitude computed will not be above one-fourth of the Difference between them, [a close Inference!] Whence a Judgement may be formed whether it will be necessary, or not, to repeat the Calculation [of a Fiction] over again, with the Latitude found, instead of the Latitude by Account." He should be asked concerning this most wonderful INFERENCE or CONCLUSION that ever was made, how any Method, founded upon Error, or Latitude by Account, more or less than the true Latitude by a sometimes wide Quantity, should determine Truth, nearer five Times than before? Which ought to be demonstrated. For, certainly, *Dr. Halley*, who was a great Geometer and Mathematician, as well as an able astronomical Observer, would never have advanced such a Position; nor have given a Sanction to the Use of such Tables and prolix Rules for discovering a Latitude-Fiction; when strict Truth can be had from the same Data (with less Trouble and more Satisfaction) from a direct trigonometrical Operation. See the Solution to Quest. XV. proposed in the *Palladium* 1770, for the Truth and Facility of such Operation, farther on, and Fallacy of the other.

N. B. To give the Answer to this Question from the near, though uncertain, Times of both Observations, by the Watch, (for which there is an easy Solution) while the Interval is true, would come nearer Truth than by *Mr. Maskelyne's* Solution, in his *Mariner's Guide*, (requiring an improved Edition), or than that by the *Amsterdam Tables*, (at the End of the *Naut. Eph.* 1771), first sold to *Messrs. Mount and Pagon* Tower-Hill, by *Mr. Edward Harrison* of *Whitebaven*; who had the same of a *Hollander*, and afterwards sold or presented to the *C—rs* of *L—de* by *Mr. Cornelis Douwes*, Examiner of *Amsterdam* Pilots, for 50*l.* Reward; though as much a Piece of *Amsterdam* Quackery, as was the *London* one of *Mrs. Stevens's* Medicine for the Stone; each equally answering the same useful public

To sit at BOARDS our Sages* must have done,
Or to their Aid must call in Em-r--n. †
Let him preside o'er mathematic Rules,
And be the Guide in academic Schools;
He'll teach you Truth and Science, without Fees,
From Qu-cks of Art to Doctors of Degrees.

* Who adjudged the Reward to the Cambridge Longitude-Rules, as superior to all others, for putting the Nautical Ephemeris in Practice at Sea; because it was for their own present Honour and Advantage.

† See his *Course of Mathematics*, (sold by Mr. Nourse in the Strand) improving on every Branch of mathematical Science before published.

The PALLADIUM-AUTHOR.

REMARK.

* * Our Correspondents, in general, are desired to send all their Letters and Productions before the End of May, (franked or Post paid); the sooner they send the more they can be obliged; directed to the Palladium-Author, at Mr. Cole's, Mathematical-Instrument-Maker, in Fleet street, London.

Where Gentlemen and Ladies may be accommodated with optical Glasses, and all Sorts of mathematical Instruments, of the newest Improvement; and may be supplied with new Instruments of any Kind, according to the Model of the Inventor, on reasonable Terms.

N. B. Here also all Masters of Men of War may be furnished with Longitude-Quadrants and Sextants, made by the best Hands, according to the greatest Accuracy, without being subject to Error by Warping, for observing the Distance of the Moon from the Sun or a Star, at Sea, by bringing them in Contact by Reflection; and for taking their Altitudes, by bringing the Object and Horizon together, by Reflection, to the greatest Precision that the Nature of such an Observation can admit of. Made for putting the Nautical Ephemeris in Practice, and keeping a Ship's Longitude, at Sea, by Observation, from the Meridian of the Royal Observatory at Greenwich.

Just published, and sold by Mr. Nourse, in the Strand, London,

A SYSTEM OF ASTRONOMY: Containing the Investigation and Demonstration of the Elements of that Science. By W. EMERSON. Price 7s.

Motibus astrorum nunc quæ sit causa canamus. Lucret. l. 5.

Wherein new Improvements are made in every Branch of that Science.

I. And also Mechanics, or the Doctrine of MOTION. Comprehending, 1. The general Laws of Motion. 2. The Descent of Bodies perpendicularly and down inclined Planes; and also in Curve-Surfaces. The Motion of Pendulums. 3. Centers of Gravity; the Equilibrium of Beams of Timber, and their Forces and Directions. 4. The mechanic Powers. 5. The comparative Strength of Timber and its Strefs. The Powers of Engines, their Motion and Friction. 6. Hydrostatics, and Pneumatics.

Da veniam scriptis, quorum non gloria nobis

Causa, sed utilitas officiumque fuit. Ovid. Pont. 3.

II. The Projection of the Sphere, orthographic, stereographic, and gnomonical; both demonstrating the Principles, and explaining the Practice, of these three several Sorts of Projection. Second Edition corrected. In minimis usus.

III. The Laws of centripetal and centrifugal Forces: Shewing the Motion of Bodies in circular Orbits, and in the conic Sections, and other Curves. Explaining the perturbing Force of a third Body. With many other Things of like Nature. Being a Work preparatory to Astronomy, and the very Basis thereof: And absolutely necessary to be known by all such as desire to be Proficients in that Science. *Solis uti varios, cursus lunæque meatus,*

Noscere possemus, quæ vis et causa fieret. Lucret. l. 5.

These Three Price 7s. together. By W. EMERSON. * * Improving on all former Improvements.

PALLADIUM-AUTHOR.
A NEW

THE BRITISH PALLADIUM, or

A NEW GUIDE to the YEAR 1770.

PART I.

To find the Day of the Month from the Day of the Week, and Day of the Week from the Month-Day.

Against each Month of the Year, to the Right-hand, stand the Seven Week-Days, above which stand all the Month-Days in that Month, answering to each Week-Day.		MONTH DAYS and WEEK DAYS.						
		1	2	3	4	5	6	7
Contrarily. Under any Month-Day stands the Week-Day against that Month, at the Angle of Meeting.		8	9	10	11	12	13	14
		15	16	17	18	19	20	21
		22	23	24	25	26	27	28
		29	30	31				
MONTHS of the YEAR.		Mo	Tu	We	Th	Fr	Sa	Su
January.	October.	Mo	Tu	We	Th	Fr	Sa	Su
February.	March.	Th	Fr	Sa	Su	Mo	Tu	We
April.	July.	Su	Mo	Tu	We	Th	Fr	Sa
	May.	Tu	We	Th	Fr	Sa	Su	Mo
	June.	Fr	Sa	Su	Mo	Tu	We	Th
	August.	We	Th	Fr	Sa	Su	Mo	Tu
September.	December.	Sa	Su	Mo	Tu	We	Th	Fr

For Construction of the above Table, see P. 2, Palladium, 1763.

EXAMPLE I. To find the Day of the Month answering to the third Sunday in September, 1770.

To the Right hand of September you find Su, or Sunday; directly above which, in the Columns among the Month-Days, stand 2, 9, 16, 23, and 30, answering to all the Sundays in September: Therefore the third Sunday is the 16th Day, required. So for other like Cases.

EXAMPLE II. To find the Day of the Week on which the 1st of April happens, 1770.

Under 1, the Month-Day, against April, at the Angle where both Columns meet, stands Su, or Sunday, required. So for other like Cases.

NOTES for 1770.		Moveable FEASTS.		SUN rises.			
Dom. Let. N.S.	G	Feb. 11. Septuages.	Mths.	1st	11th	21st	Examples.
O. S.	C	28. Ash-Wed.					
Golden Number	4	Mar. 4. 1st Sund. Lent		h m	h m	h m	Against May
Epact (or γ)'s Age at		Apr. 15. East. Sund.	Jan.	8 57	58 7	45	the Sun rises
Year's Beginning	3	May 20. Rog. Sund.	Feb.	7 22	7 6	30	h m
Sun's Cycle	15	24. Ascension	Mar.	6 32	6 12	52	1st 4 35
Roman Indiction	18	Jun. 3. Whitsunday	April	5 31	5 11	4 53	11th 4 20
Æra Jul. Per. 6483		17. Trin Sund.	May	4 35	4 20	4 4	21st 4 4
- Olympiads 2545		Dec. 2. Advent Sun.	June	3 51	3 45	4 43	Dif. 15 ^m in
- Found. Rome 2522			July	3 46	3 54	4 4	24 Hours, &
- Nabonasser 2516			Aug.	4 20	4 36	4 54	16 ^m less for
- Hegira 1148			Sep.	5 15	5 32	5 54	10Ds. or 1 ^m 1/2
Gregorian Æra 188		Ember-Days.	Oct.	6 13	6 33	6 33	a Day nearly.
		April 7, 9, 10.	Nov.	7 12	7 30	7 45	N. B. Sun-
Jul. Per. 1 Yr. more		June 6, 8, 9.	Dec.	7 58	8 6	8 8	rising sub.
than by French Acct.		Sep. 19, 21, 22.					from 12 ^h
Nabonasser & Found.		Dec. 20, 22, 23.					gives Sun-
Rome 1 Year less.							setting.

Astronomical

Astronomical MOONS for Greenwich Observatory. 1770.

First Quarter.			Full Moon.			Last Quarter.			New Moon.		
Mths.	d	h m	d	h m		d	h m		d	h m	
Jan.	5	1 5M	11	5 7A	---	18	5 25A	---	26	11 1A	---
Feb.	3	0 5A	10	4 13M	---	17	0 53A	---	25	3 41A	---
Mar.	4	8 35A	11	3 55A	---	19	9 31M	---	27	5 31M	---
Apr.	3	3 29M	10	4 29M	---	18	5 9M	---	25	4 41M	---
May	2	8 51M	9	6 21A	---	17	10 11A	---	25	0 31A	---
June	30	0 31M	8	9 21M	---	16	0 6A	---	23	8 31M	---
July	29	11 36M	8	0 16M	---	15	11 6A	---	22	3 31A	---
Aug.	28	2 27M	6	3 21A	---	14	8 3M	---	20	10 51A	---
Sep.	26	8 26A	5	6 6M	---	12	3 26A	---	19	7 51A	---
Oct.	26	4 31A	4	8 11A	---	11	10 11A	---	18	7 26A	---
Nov.	25	0 56A	3	9 31M	---	10	5 1M	---	17	10 6M	---
Dec.	25	8 11M	2	10 5A	---	9	1 21A	---	17	3 31M	---

N. B. M stands for Morning and A for Afternoon.

Add to the Month-day for the Moon's Age.		New Moon.	Sun and Moon's Place at New Moon.	Sun enters Signs.	Sub. and add from and to D's Southing for her Rising & Setting.		To find the Tides at London.	
					Moon's Place.	Arc \mp .	Rule. Add 2 30m to Time of D's Southing (fr. the Table of her Southing) for Time of High Water required.	
Jan.	3	26	s 0	d	s 0	h m	Ex. July 20, 1770, D's Southing by Tab following 9 ^h 42 ^m Add 2 30	
Feb.	5	25	10 7	♊ 19	3 0	8 30	H.W. 0 a 12	
Mar.	3	27	11 7	♋ 18	4 2	8 15	Add 5 30	
Apr.	4	25	0 7	♌ 20	5 1	7 15	L.W. 5 a 42	
May	5	25	1 5	♍ 20	6 0	6 15	at Lond. Bridge.	
June	6	23	2 4	♎ 21	7 11	5 15	N.B. Time of H. & L.W. at Lond. serves for Boats bound down & up the R. or fr ab. & below Bridge, to Lond. respecty.	
July	7	22	3 2	♏ 21	8 10	4 15	Gen. Rule. Add the T. of H.W. at N. and Full Moon for any Place, according to a Tide Tab. to the Time of D's Southing, that Day, for H.W. at that Place.	
Aug.	9	20	4 0	♐ 22	9 0	4 0		
Sep.	11	19	4 27	♑ 23	9 20	4 15		
Oct.	11	18	5 27	♒ 23	10 29	5 15		
Nov.	13	17	6 25	♓ 23	0 0	6 15		
Dec.	13	17	7 25	♊ 22	0 29	7 15		
			8 26	♋ 21	1 28	8 15		

Here the Day of N. D. and N^o. added for the following Month make up the Days in the present Month.

Exam. Jan. N. D. 26, and Feb. 5, added = 31 Ds. in Jan. the present Month. N. D. 5. 19 & Oct. 11 added = 30 Ds. in Sept. &c

To find Moon's Age.

Ex. I. April 15 Add 4

Moon's Age 19

Ex. II. Sept. 23 Add 11

Abate 34

Moon's Age 4
N.B. When Age is above 29 or 30 Ds. sub. 29 or 30, as 1st & 2d Cols make 29 or 30.

Sub. or add Deg. for Ds. bef. or aft. Centers a Sn. for his Place. Required Sun's Place April 29, 1770.

25 Ap. ☉'s Pl. 1st 5^o 4 Ds. & Deg^s. 0 4

29 Ap. ☉'s Pl. 1 9

Req D's Pl. Ap. 20 D's Age 24 by 13^o 12^o

= 10^o 12^o

D's Pl. at } N. D add } 1 5

D Pl. Ap. } 20, Noon } 11 17

A near Comput. only

Req. Moon's Rising & Setting, Ap. 20, 1770 D m. Pl. ab. 11st 1^o 0

Arc* corref \mp 5^h 50 D's So. that D. 7th 45 Moon rises 1m 55 Sets 1a 35

N.B. Take the Arc \mp nearest or proper to D's Place above.

*N. B. The Festival marked * is preceded by a Vigil or Fast. If any of the Feast-days fall on a Monday, the Vigil or Fast-day must be kept on the Saturday before, and not on the Sunday, which is the greatest of Festivals.*

The Days having this Mark, †, against them are Holidays observed at the Exchequer, Stamp Office, Excise-Office, Custom-House, Bank, East India and South Sea House.

At the Custom-House there is no Holiday on Valentine, St. David, Shrove-Tuesday, Easter-Wednesday, St. Swithin, Lammas-day, Fire of London, or Holy Rood.

††† The Offices are mentioned 'All but such and such,' after †, where no Holidays are kept, when they are kept in all the other Offices.

JANUARY, XXXI DAYS.

- 1 Circumcision. †
- 4 Sir Isaac Newton born 1643.
- 5 Old Christmas-day.
- 6 Epiphany, or Twelfth day. †
All but South-sea House.
- 7 1 Sunday after Epiphany.
- 8 Lucian.
- 13 St. Hilary.
- 14 2 Sunday after Epiphany.
- 15 Exchequer opens. Oxford and Cambridge Terms begin.
- 17 Old Twelfth-day.
- 18 Prisca. Q. Cha. Birth-day kept. †
- 20 Fabian. 1 Return.
- 21 3 Sunday after Epiphany. Agnes.
- 22 Vincent.
- 23 Hilary Term begins.
- 25 Conversion of St. Paul. †
- 27 2 Return.
- 28 4 Sunday after Epiphany.
- 30 K. Charles I. beheaded 1648-9,
O. S. 12 Minutes past One. †

FEBRUARY, XXVIII DAYS.

- 2 Purific. B. V. or Candlemas. †
- 3 Bishop Blaize. 3 Return.
- 4 5 Sunday after Epiphany.
- 5 Agatha.
- 9 4 Return.
- 10 Dies scolastica at Oxford.
- 11 6 Sun. after Epiph. Septuagesima.
- 12 Hilary Term ends.
- 13 Old Candlemas-day.
- 14 Valentine. † All but Stamp, Custom, and South-sea House.
- 18 7 Sun. after Epiph. Sexagesima.
- 24 St. Matthias. * †
- 25 Shrove Sunday, or Quinquagesima.
- 26 Shrove Monday.
- 27 Shrove Tuesday. † All but the Custom-House.

- 28 Ash-Wednes. † 1 Day in Lent.
Hare-hunting goes out.

MARCH, XXXI DAYS.

- 1 Cambridge Commencement for B. A. Day after Ash Wednes. St. David. Anniversary Meeting of the Welch Society, who wear a Leek on this Day in Memory of a famous Victory gained over the Saxons. † All but the Stamp and Custom-H.
- 2 Chad. B.
- 4 Quadragesima. 1 Sunday in Lent.
Hilary Term ends.
- 5 Princess Mary of Hesse b. 1722.
- 7 Perpet. Maurin.
- 7, 9, and 10, Ember-days.
- 11 2 Sunday in Lent.
- 16 Gregory.
- 17 St. Patrick, Bishop of Ireland.
- 18 3 Sunday in Lent. Edward, King of the West Saxons.
- 19 Joseph.
- 20 Cuthbert. Equal Day and Night.
- 21 St. Benedict.
- 25 4 Sunday in Lent. LADY-DAY.
First Quarter-day. Annunciation. * †
- 29 Cambridge latter Act, Thursday after the 4th Sun. in Lent.

APRIL, XXX DAYS.

- 1 5 Sunday in Lent. Fool's-Cap Day, or Exeter Jack.
- 3 Richard, B. of Chichester.
- 4 St. Ambrose.
- 5 Old Lady-day.
- 7 Oxford and Cam. Terms end.
- 8 6 Sunday in Lent. Palm-Sund.
- 12 Maunday-Thursd.
- 13 Good-Friday. †

15 EASTER

- 9 Old Lady-day.
 7 1 *Sund. after Easter. Low-Sund.*
 10 Oxford and Camb. Terms begin.
 14 2 *Sunday after Easter.*
 15 Sun and Clocks together.
 19 Alphege.
 21 3 *Sunday after Easter.*
 22 2 Return.
 23 St. George. †
 25 St. Mark. †
 27 Victory of Culloden.
 28 4 *Sunday after Easter.*
 29 3 Return. Westminster. Election.

MAY, XXXI DAYS.

- 1 St. Philip and St. James. †
 3 Invention of the Cross.
 5 5 *Sunday after Easter.*
 6 St. John ante Port. Lat. 4 Ret.
 6, 7, 8, Rogation-days.
 9 Ascension-day, or Holy Thurs. †
 All but the South-sea House.
 10 5 Return.
 12 6 *Sund. after Easter.* Old May-d.
 13 Easter Term ends.
 16 Oxford Term ends.
 19 WHIT-SUNDAY. Dunstan.
 Queen Charlotte born 1744.
 20 Whit-Monday. †
 21 Whit-Tuesday. †
 22 Whit-Wednesday. † All but
 the Custom-house.
 22, 24, 25, Ember-days.
 26 *Trinity-Sunday.* Augustine. No
 Night but Twilight.
 27 Ven. Bede. 1 Return.
 29 King Charles II.'s Nativity and
 Restorat. after 12 Years Exile.
 Oxf. and Camb. Terms begin.
 30 Corpus Christi.
 31 Trinity Term begins.

JUNE, XXX DAYS.

- 1 Nicomedes.
 2 1 *Sunday after Trinity.*
 3 2 Return.
 4 King George III. born 1738. †
 5 Boniface.
 9 2 *Sunday after Trinity.*
 10 Princess Amelia b. 1711. † All
 but Excheq. and Custom-house.
 3 Return.
 11 St. Barnabas. †
 16 3 *Sunday after Trinity.*
 17 St. Alban.

- 19 Trinity Term ends.
 20 Transl. of Edw. K. W. Saxons.
 22 Longest Day.
 23 4 *Sunday after Trinity.*
 24 ST. JOHN BAPTIST. † Se-
 cond Quarter-day.
 25 St. John's College Election.
 29 St. Peter and Paul. †
 30 5 *Sunday after Trinity.*
 Buck-hunting comes in & con-
 tinues till Holy-rod. Exeter &
 Wadhams Col. Elect. at Oxf.
 JULY, XXXI DAYS.

- 2 Cambridge Commencement for
 B. A. 1st Tuesday in July.
 Visitation of the B. V. Mary.
 3 Dies Comitiorum.
 4 Translat. of St. Martin, Bishop.
 5 Cambridge Term ends.
 Old Midsummer-day.
 7 6 *Sunday after Trinity.*
 Tho. à Becket, Church Tyrant.
 9 Oxford Act, 7 Days from Cam-
 bridge Commencement.
 13 Oxford Term ends.
 14 7 *Sunday after Trinity.*
 15 St. Swithin. † All but Stamp,
 Custom, and South-sea House.
 20 Margaret, Virgin and Martyr.
 21 8 *Sunday after Trinity.*
 22 Mary Magdalen.
 Q. of Denmark born 1751. †
 24 Magdalen College Election.
 25 St. James * †
 26 St. Ann, Mother of B. V. M.
 27 Portsmouth-Dock fired at 4 in
 the Morning, 1770.
 28 9 *Sunday after Trinity.*
 30 Dog-days begin. Canicula rises
 with the Sun.

AUGUST, XXXI DAYS.

- 1 Lammas-Day. †
 4 10 *Sunday after Trinity.*
 Crown-Point in America taken
 by General Amherst, 1759.
 6 Transfiguration.
 7 Name of Jesus.
 10 St. Laurence.
 11 11 *Sunday after Trinity.*
 Princess of Brunswick b. 1737. †
 All but Cust. and S. S. H.
 12 Old Lammas-day.
 Prince of Wales born 1762. †
 15 Assumption.
 16 Prince Frederick born 1763.

- 23 12 *Sunday after Trinity.*
 21 Athanasius. Pr. Wm b. 1765.
 24 St. Bartholomew. †
 25 13 *Sunday after Trinity.*
 28 St. Augustine.
 29 Beheading of St. John Baptist.
 30 Sun and Clocks together.

SEPTEMBER, XXX DAYS.

- 1 14 *Sund. after Trin.* St. Giles.
 2 London burat, 1666, O. S. †
 7 Eunuchus.
 8 15 *Sunday after Trinity.*
 Nativity of the B. V. Mary.
 9 Dog-days end. Canis Major rises at 3 in the Morning.
 14 Holy-Cross Day. † All but Sta. Custom and South-sea House.
 15 16 *Sunday after Trinity.*
 17 Lambert B.
 18 City of Quebec surrendered to General Townshend, 1759.
 K. George I. and II. landed. † All but at the Custom-house.
 18, 20, 21, Ember-days.
 21 St. Matthew. †
 22 17 *Sunday after Trinity.*
 K. Geo. III. and Q. Charlotte Cor. † Equal Day and Night.
 26 St. Cyprian.
 28 Sheriffs of London sworn.
 29 18 *Sunday after Trinity.*
 ST. MICHAEL, third Quarter-day. † Hare-hunting comes in and lasts till the End of Feb.
 Princess Charlotte b. 1766.
 30 St. Jerome.

OCTOBER, XXXI DAYS.

- 1 Remigius, Bishop of Rhemes.
 6 19 *Sun. after Trinity.* St. Faith.
 9 St. Dennis.
 10 Old Michaelmas-day. Oxford and Cambridge Terms begin.
 13 20 *Sunday after Trinity.*
 Transl. of K. Edw, Confessor.
 17 Etheldred V.
 18 St. Luke the Evangelist. †
 19 St. Frideswide, a Festiv. at Court.
 20 21 *Sunday after Trinity.*
 25 K. George III.'s Accession. †
 26 St. Crispin. K. Geo. III. proclaimed. † All but the Stamp, Excise, Custom and S. S. H.
 27 22 *Sunday after Trinity.*
 28 St. Simon and Jude. †

NOVEMBER, XXX DAYS.

- 1 All Saints. †
 2 All Souls. † All but the Stamp, Custom and South-sea House.
 3 23 *Sunday after Trinity.*
 4 1 Return. All-Souls Col. Elect.
 K. William b. 1605, O. S.
 5 Gun-Powder Treason. †
 6 Leonard. Mich. Term begins.
 7 Duke of Cumberland b. 1745.
 9 Lord-Mayor's Day, London. † All but the Exchequer.
 10 24 *Sunday after Trinity.*
 11 St. Martin.
 12 2 Return.
 13 Britius, Bishop.
 15 Machutus.
 17 25 *Sun. after Trin.* Hugh Bp. of Lincoln. Annivers. of Q. Eliz. Procl. † All but Cust. & S. S. H.
 18 3 Return.
 20 Edmund, King and Martyr.
 22 Cecilia. Old Martinmas-day.
 23 St. Clement.
 24 26 *Sunday after Trinity.*
 25 St. Catherine. 4 Return.
 D. of Gloucester born 1743. †
 28 Michaelmas Term ends.
 Baliol College Election Thursday before St. Andrew.
 30 St. Andrew. † Princess Dowager of Wales born 1719. †

DECEMBER, XXXI DAYS.

- 1 *Advent Sunday.*
 4 Barbary.
 6 Nicholas.
 8 2 *Sunday in Advent.*
 Conception of the B. V. M.
 13 Lucy.
 15 3 *Sunday in Advent.*
 16 O Sapientia. Camb. Term ends.
 17 Oxford Term ends.
 18, 20, 21, Ember-days.
 21 St. Thomas. †
 22 4 *Sunday in Advent.* Shortest-D.
 23 Sun and Clocks together.
 25 CHRISTMAS-DAY, 4th Quarter-Day. Fox-hunting comes in and lasts till Lady-day.
 26 St. Stephen. †
 27 St. John the Evangelist. †
 28 Holy Innocents.
 29 1 *Sunday after Christmas.*
 31 Silvester, Bishop of Rome.

A TABLE of the MOON'S South'ing, or when she passes the Meridian of Greenwich Observatory, for the Year 1771. For the Use of Seamen.

D.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	Morn	1m 1	Morn	1m 5	1m 41	2m 55	3m 0	3m 44	4m 52	5m 38	7m 17	7m 42
2	0 34	1 55	0 34	2 1	2 34	3 42	3 43	4 28	5 46	6 34	8 10	8 34
3	1 35	2 49	1 28	2 55	3 27	4 26	4 25	5 13	6 40	7 29	9 2	9 27
4	2 32	3 40	2 22	3 49	4 15	5 9	5 6	6 2	7 37	8 26	9 55	10 20
5	3 25	4 31	3 14	4 40	5 4	5 52	5 49	6 54	8 35	9 21	10 48	11 14
6	4 16	5 21	4 8	5 30	5 49	6 34	6 33	7 48	9 32	10 16	11 44	0a 10
7	5 6	6 12	4 59	6 18	6 33	7 16	7 22	8 46	10 29	11 10	0a 40	1 3
8	5 55	7 3	5 51	7 4	7 16	8 1	8 12	9 46	11 27	0a 5	1 36	1 55
9	6 44	7 53	6 40	7 50	7 59	9 48	9 7	10 47	0a 23	1 1	2 30	2 44
10	7 34	8 43	7 30	8 34	8 42	9 38	10 6	11 45	1 9	1 58	3 24	3 31
11	8 23	9 30	8 16	9 17	9 25	10 31	11 4	0a 41	2 14	2 53	4 14	4 15
12	9 11	10 15	9 2	9 59	10 11	11 29	0a 6	1 30	3 9	3 48	5 2	4 58
13	10 0	10 59	9 47	10 43	11 1	0a 28	1 3	2 31	4 3	4 42	5 40	5 39
14	10 49	11 43	10 29	11 28	11 53	1 27	2 1	3 26	4 57	5 32	6 31	6 21
15	11 37	0a 26	11 12	0a 16	0a 48	2 26	2 55	4 18	5 50	6 21	7 13	7 4
16	0a 22	1 8	11 56	1 5	1 46	3 21	3 48	5 11	6 41	7 7	7 55	7 47
17	1 5	1 50	0a 38	1 57	2 43	4 16	4 39	6 3	7 31	7 51	8 36	8 33
18	1 48	2 34	1 24	2 53	3 41	5 7	5 31	6 55	8 18	8 34	9 20	9 21
19	2 29	3 19	2 11	3 50	4 37	5 57	6 23	7 47	9 3	9 17	10 5	10 13
20	3 11	4 8	3 2	4 47	5 31	6 48	7 13	8 37	9 47	10 9	10 54	11 7
21	3 54	4 58	3 54	5 42	6 23	7 37	8 4	9 25	10 30	11 43	12 44	Morn
22	4 37	5 52	4 50	6 38	7 14	8 29	8 56	10 12	11 13	11 27	Morn	0 3
23	5 23	6 49	5 47	7 32	8 4	9 20	9 4	10 57	11 55	Morn	0 36	0 59
24	6 13	7 47	6 44	8 24	8 55	10 13	10 37	11 40	Morn	0 14	1 30	1 56
25	7 7	8 47	7 46	9 16	9 45	11 4	11 25	M 10	0 30	1 2	2 27	2 51
26	8 4	9 45	8 37	10 8	10 39	11 56	Morn	0 23	1 24	1 52	3 21	3 45
27	8 2	10 43	9 32	11 1	11 31	Morn	0 10	5	2 10	2 46	4 15	4 38
28	10 5	11 40	10 26	11 54	Morn	0 44	0 55	1 48	2 58	3 39	5 9	5 28
29	11 6		11 20	Morn	0 24	1 31	1 39	2 31	3 50	4 34	6 0	6 18
30	Morn		Morn	0 47	1 16	2 16	2 21	3 15	4 43	5 29	6 52	7 9
31	0 2		0 13		2 7		3 2	4 2		6 2		8 12

To find Time of H. Water, on any Day of the Month, at any given Place, for 1771.

Gen. Rule. To the Time of the Moon's South'ing (fr. the above Tab.) for that Day, add the Time of H. W. at N. and F. Moon in the given Place (fr. Tide-Tab. p. 105, 106, Pal. 1765, or any other Tide-T.) and the Sum, abating 12, when above 12^h will be T. of H. W.

Example. To find the Time of High Water, at London, on Jan. 12, 1770.

From the above Table, the Moon souths, at London, on that Day, 9^h 11^m Morn. To which add the constant Time of High Water at New and Full, Lond 2 30

Time of High Water, Jan. 12, at London, 11 41 M. req.
Add for next Low Water, 5 30

Low Water at London, Jan. 12, 5 11 A.

N. B Time of H. W. serves for Boats & Vessels bound to Places below Bridge, fr. Lond. and Time of Low Water serves for Boats & Vessels bound to Places above Bridge fr. Lond.

*** Seamen may determine the Time of H. & L. W. at all Places by the foregoing Gen. Rule, fr. the above Tab. and the constant Time of H. W. at N. & F. Moon, at each Place, fr. a Tide Table. The above Table is also of Use for finding the Moon's near Time of Rising and Setting, from her mean Place, and Semi-duration Arc, for any Place.

TABLE of the Eclipses of the first SATELLITE of JUPITER. for Gr. Obs. 1771.

January.	February.	March.	April.	May.	June.
Immerf.	Immerf.	Immerf.	Immerf.	Immerf.	Immerf.
<i>U</i> this Mth being so near O, the Eclip. of his Sat. can not be seen. The *is plac'd against the visible Eclip- ses of the first Sat. of <i>U</i> for Greenwich. N.B. When the Time at the Ship is lat- ter than that at Greenwich, the Longitude is East; if sooner, West fr. Greenwich.	D. h m s 1 19 48 18 3 14 16 30 5 8 44 44 7 3 13 0 8 21 41 19 10 16 9 41 12 10 37 51 14 5 6 31 15 23 34 59 17 18* 3 30 19 12 32 2 21 7 0 36 23 1 29 12 24 19 57 48 26 14 26 27 28 8 55 17	D. h m s 2 3 23 48 3 21 52 30 5 16 21 13 7 10 49 58 9 5 18 43 10 23 47 29 12 18 16 17 14 12 45 6 16 7 13 55 18 1 42 46 20 11 37 22 14 40 27 24 9 9 18 25 3 38 19 26 22 6 59 28 16* 35 49 30 11 4 39	D. h m s 1 5 33 30 3 0 2 19 4 18 31 8 6 12 59 57 8 7 28 44 10 1 57 29 11 20 26 13 13 14* 54 57 15 9 23 42 17 3 52 26 18 22 21 10 20 16 49 53 22 11 18 35 24 5 47 15 26 0 15 53 27 18 44 29 29 13* 13 2 31 9 43 5	D. h m s 1 7 41 34 3 2 10 4 4 20 38 33 6 15* 7 1 8 9 35 27 10 4 3 53 11 22 32 17 13 17 0 40 15 11 29 2 17 5 57 22 19 0 25 39 20 18 53 56 22 13* 22 11 24 7 50 13 26 2 18 35 27 20 46 56 29 15 14 56 31 9 43 5	D. h m s 2 4 11 35 3 22 39 25 5 17 7 34 7 11* 35 41 9 6 3 47 11 0 31 52 12 18 59 56 14 13* 28 1 16 7 56 6 18 2 24 12 19 20 52 19 21 15* 20 27 23 9* 48 35 25 4 16 44 26 22 44 54 28 17 13 4 30 11* 41 15

July.	August.	Septemb.	October.	Novemb.	Decemb.
Immerf.	Emerfions	Emerfions	Emerfions	Emerfions	Emerfions
D. h m s 2 6 9 26 4 0 37 39 5 19 5 54 7 13* 34 8 9 8* 2 26 11 2 30 46 12 20 59 8 14 15* 27 31 16 Emerfions 17 12* 10 43 18 6 39 13 20 1 7 43 21 19 36 16 23 14* 4 52 25 8* 33 28 27 3 2 11 28 21 37 57 30 15 59 47	D. h m s 1 10* 28 41 3 4 57 34 4 23 26 30 6 17 55 29 8 12* 24 31 10 6 53 35 12 1 21 41 13 19 51 49 15 14 20 59 17 8* 50 5 19 3 19 13 20 21 48 24 22 16 17 36 24 10* 46 51 26 5 16 8 27 23 45 26 29 18 14 47 31 12* 44 9	D. h m s 2 7* 13 43 4 1 42 59 5 20 12 26 7 14 41 55 9 9* 11 24 11 3 40 56 12 22 10 28 14 16 40 2 16 11* 9 36 18 5 39 8 20 0 8 40 21 18 38 12 23 13 7 43 25 7* 37 14 27 2 6 46 28 20 36 18 30 15 5 49	D. h m s 2 9* 35 20 4 4 4 49 5 22 34 18 7 17 3 45 9 11 33 10 11 6* 2 33 13 0 31 54 14 19 0 55 16 13 30 35 18 7* 59 53 20 2 29 8 21 20 58 21 23 15 27 33 25 9 56 42 27 4 25 47 28 22 54 50 30 17 23 50	D. h m s 1 11 52 49 3 6* 21 47 5 0 50 42 6 19 19 34 8 13 48 28 10 8* 17 5 12 2 45 48 13 21 14 28 15 15 43 5 17 10 11 39 19 4 40 10 20 23 8 39 22 17 37 5 24 12 5 28 26 6* 33 49 28 1 2 6 29 19 30 21	D. h m s 1 13 58 34 3 8 26 44 5 2 54 52 6 21 23 0 8 15 51 7 10 10 19 11 12 4* 47 13 13 23 15 12 15 17 43 9 17 12 11 8 19 6 39 6 21 1 7 3 22 19 35 0 24 14 2 46 26 8 30 41 28 2 58 45 29 21 26 38

To find the Difference of Longitude from Greenwich Observatory.

Rule. The Difference of Time between any Eclipse of Jupiter's first Satellite, at Greenwich, happening as above, and the Time the same Eclipse is observed to happen under a distant Meridian, being turned into Degrees, will be the Difference of Longitude between Greenwich and the Place of Observation.

Example. Eclipse of 1st Satellite of Jupiter at Greenwich, Oct. 2^d 9^h 35^m 20^s
The same being observed at Sea, or a distant Port, sooner, 2 7 20 5

Hence, Long. to the West of Greenwich, 31° 48' 45", req. Dif. 2 15 15

Three ECLIPSES of the SUN, and Two of the MOON, for 1771.

I. *Of the SUN.* April 15, at 8 h. 57 m. Afternoon, with $1^{\circ} 7'$, Moon's North Latitude. Invisible in *Europe*, but visible in *North-America*. The inferior Limb of the Moon touches the superior Limb of the Sun at Noon, in Latitude 50° and Longitude 244, North of *California*.

N. B. This Eclipse has been unnoticed by the present *Astronomer Royal* at *Greenwich*, who is *Conduetor-General* of the *Nautical Ephemeris*.

II. *Of the MOON*, visible, April 29, in the Morning, apparent Time, computed for *Greenwich Observatory*. By Mr. Thomas Ingham, of *Lincolnshire*, according to the *Durham Tables*.

		h	m	s		
Beginning	- - -	0	59	22	} App. Time, <i>Greenw.</i>	Hourly Motion of the Sun $2^{\circ} 26''$
Ecliptic Opposition	- - -	1	58	23		Semi-Diameter of the Sun $15^{\circ} 53'$
Middle	- - -	2	7	38		Hourly Motion of Moon $34^{\circ} 25'$
End	- - -	3	15	54		Horizontal Par. Moon $58^{\circ} 22'$
Duration	- - -	2	16	32		Semi-diam. of the Moon $15^{\circ} 55'$
Digits	- - -	4	15	15''		Lat. Moon N. D. - - - $47^{\circ} 47'$
						Hourly Mot. Moon fr. Sun $33^{\circ} 9'$
						Semidiam. Earth's Shadow $43^{\circ} 9'$
						Parts deficient - - - $11^{\circ} 17'$
According to the <i>Nautical Ephemeris</i>	Beginning	0 ^h 59 ^m $\frac{1}{2}$			} So that we shall see (when this Eclipse happens) which Computation and Tables come nearest the Truth, or best agree with Observation; provided there be no Juggling among the several Observers and Virtuofos for executing the present Office of <i>Astronomer Royal</i> .	
	Middle	2	6			
	End	3	12	$\frac{1}{2}$		
	Digits	4	23			
According to the <i>Connoissance des Temps</i> , by Mr. <i>De la Lande</i> .	Begin.	1 ^h	3 ^m 43 ^s		} Semidiameter of the Moon $15^{\circ} 54''$	Horizontal Parallax $58^{\circ} 15'$ Hourly Motion in Ecliptic $34^{\circ} 18'$ In Latitude $3^{\circ} 8'$
	Middle	2	8	18		
	End	3	12	55		
	Digits	4	0	12' on the North Limb.		

III. *Of the SUN.* May 14, at 3 h. 11 m. Afternoon, with $36'$ Moon's South Latitude; and therefore invisible in *Europe*.

This Eclipse is central and total in 58° South Latitude, and 330° Longitude, Southward of the Straights of *Magellan*; and seen eclipsed on the Meridian in those Southern Parts of the Globe; and will be visible, more or less, in the *Atlantic Ocean*.

IV. *Of the MOON.* October 23, at 3 h. 37 m. in the Afternoon; ending at 5 h. 53 m. with 4 Digits 36 Minutes on the Moon's Southern Limb; visible in *Asia*, and in the Eastern Part of *Europe*; and (according to the *Nautical Ephemeris*) partly at *Greenwich*.

Beginning	3 ^h 36 ^m $\frac{1}{2}$	End	5 ^h 56 ^m
Middle	4	46	Digits 4 ^o 24'

V. *Of the SUN.* November 6, at 7^h 3^m in the Afternoon, with $32'$ Moon's North Latitude. Not visible in *Europe*.

But visible and total in 17° North Latitude and 271° Longitude, near *Acapulco* in *North-America*, and the Western Coast of *Mexico*; but will appear of greater or less Magnitude to the several Inhabitants in *North-America*.

A COMPARISON of some Lunations according to the British Nautical Ephemeris conducted by Mr. Maskelyne, and the French Connoissance des Temps, conducted by Mr. De la Lande.

	d	h	m		
April 15	2	39	M. Nautical Ephemeris.	} Dif. 6 h. 18 m. — Naut.	New Moon.
	8	57	A. Con. des Temps.		
September 23	11	50	A. Nautical Ephemeris.	} Dif. 0 h. 31 m. — Naut.	Full Moon.
	24	0	M. Con. des Temps.		
December 21	10	28	A. Nautical Ephemeris.	} Dif. 2 h. 3 m. — Naut.	Full Moon.
	22	0	M. Con. des Temps.		
	28	5	A. Nautical Ephemeris.	} Dif. 0 h. 30 m. — Naut.	Last Quarter.
		36	A. Con. des Temps		

Quere the Cause of so great a Difference between different Computers ?

REMARK.

Our Correspondents, in general, are desired to send all their Letters and Productions before the End of May, (franked or Post-paid) ; the sooner they send the more they can be obliged ; directed to the Palladium-Author, at Mr. Cole's, Mathematical Instrument-Maker, in Fleet-Street, London.

Where Gentlemen and Ladies may be accommodated with optical Glasses, and all Sorts of mathematical Instruments, of the newest Improvement ; and may be supplied with new Instruments of any Kind, according to the Model of the Inventor, on reasonable Terms.

N. B. Here also all Masters of Men of War may be furnished with Longitude-Quadrants and Sextants, made by the best Hands, according to the greatest Accuracy, without being subject to Error by Warping, for observing the Distance of the Moon from the Sun or a Star, at Sea, by bringing them in Contact by Reflection ; and for taking their Altitudes, by bringing the Object and Horizon together, by Reflection, to the greatest Precision that the Nature of such an Observation can admit of. Made for putting the Nautical Ephemeris in Practice, and keeping a Ship's Longitude, at Sea, by Observation, from the Meridian of the Royal Observatory at Greenwich.

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NAVIGATION BOOKS and SEA-CHARTS of all Sorts.

Of the SUPREME BEING and CREATOR of the Universe ; and his Influence and Dominion over all his wonderful Works. By a Celebrated AUTHOR.

AS we cannot but conceive the *Universe* as depending on the *first Cause* and *chief Mover*, whom it would be absurd, not to say *impious*, to exclude from acting in it ; so we have some Hints of the Manner in which he operates in *Nature* ; from the *Laws* which we find established in it. Though he is the Source of all Efficacy, yet we find that Place is left for *second Causes* to act in Subordination to him ; and *Mechanism* has its Share in carrying on the great *Scheme* of *Nature*. The establishing the Equality of Action and Re-action, even in those Powers which seem to surpass *Mechanism*, and to be more immediately derived from them, seems to be an Indication, that those Powers, while they derive their *Efficacy* from Him, are however, in a certain Degree, circumscribed and regulated in their Operations by *mechanical Principles* ; and that they are not to be considered as mere immediate Volitions of his, (as they are often represented), but rather as Instruments made by Him, to perform the Purposes for which He intended them.

For *Example* ; if the most noble *Phænomena* in *Nature* be produced by a *rare elastic ethereal Medium*, as Sir *Isaac Newton* conjectured, the whole Efficacy of this *Medium* must be resolved into His Power and Will who is the Supreme Cause. This, however, does not hinder but that the same *Medium* may be subject to the like *Laws* as other elastic Fluids, in its Actions and Vibrations ; and that if its Nature were better known to us, we might make curious and useful Discoveries concerning its Effects from those *Laws*. It is easy to see that this Conjecture no Way derogates from the Government and Influences of the *Deity*, while it leaves us at Liberty to pursue our Enquiries concerning the Nature and Operations of such a *Medium* : Whereas, they who hastily resolve those Powers into immediate Volitions of the *Supreme Cause*, without admitting any intermediate Instruments, put an End to our Enquiries at once, and deprive us of what is probably the most sublime Part of Philosophy, by representing it as *imaginary* and *fictional* ; by which Means they hurt those *Interests* which they appear so sanguine to promote ; for the higher we rise in the *Scale of Nature* towards the *Supreme Cause*, the Views we have from Philosophy appear more beautiful and extensive. Nor is there any Thing extraordinary in what is here represented, concerning the Manner in which the *Supreme Cause* acts in the *Universe*, by employing *subordinate Instruments* and Agents, which are allowed to have their proper Force and Efficacy : For this we know is the *Case* in the common Course of *Nature* ; where we find *Gravity*, *Attraction*, *Repulsion*, &c. constantly combined and compounded with the *Principles* of *Mechanism*. And we see no Reason why it should not likewise take Place in the more subtil and abstruse *Phænomena* and Motions of the System. It has been demonstrated by ingenious Men, that great Revolutions have happened in *former Times*, on the Surface of the Earth ; particularly from the *Phænomena* of the *Strata*, which sometimes are found to be in a very regular Manner, and sometimes to be broken and separated from each other to very considerable Distances, where they are found again in the same Order ; from the *Impressions* of Plants left upon the *hardest Bodies*, dug deep out of the Earth, and in Places where such Plants are not now found to grow ; and from *Bones* of Animals both of Land and Sea, discovered some *Hundreds* of Yards beneath the present Surface of the Earth, and at very great Distances from the Sea.

Some *Philosophers* explain these Changes by the Revolutions of *Comets*, or other natural Means : But as the *DEITY* has formed the *Universe* dependent upon himself, so as to require to be altered by Him, though at very distant Periods

Periods of Time; it does not appear to be a very important *Question* to enquire, *Whether* these Changes are produced by the *Intervention* of Instruments, or by the same immediate Influence which first gave Things their Form.

We cannot but take Notice of one Thing, that appears to have been designed by the *Author* of Nature: He has made it *impossible* for us to have any Communication from this Earth with the other great Bodies of the *Universe*, in our present State; and it is highly probable that He has likewise cut off all Communication betwixt the other *Planets* and betwixt the different Systems. We are able by *Telescopes* to discover very plainly *Mountains*, *Precipices*, and *Cavities*, in the Moon; but who tread those *Precipices*, or for what Purposes those great *Cavities* (many of which have a little *Elevation* in the Middle) serve, we know not; and are at a Loss to conceive, how this *Planet*, without any *Atmosphere*, *Vapours*, or *Sea*, (as it is now the common Opinion of *Astronomers*), can serve for like Purposes as our Earth.

We observe sudden and surprising *Revolutions* on the Surface of the great *Planet Jupiter*, which would be fatal to the Inhabitants of the Earth. We observe in them all enough to raise our Curiosity, but not to satisfy it.

From hence, as well as from the State of the moral World, and many other Considerations, we are induced to believe, that our *present State* would be imperfect without a *subsequent one*; wherein our Views of Nature and of its Great Author may be more clear and satisfactory. It does not appear to be suitable to the *Wisdom* that shines throughout all Nature, to suppose that we should see so far, and have our *Curiosity* so much raised, concerning the Works of God, only to be disappointed at the End.

As *Man* is undoubtedly the *chief Being* upon this Globe, and this Globe may be no less considerable, in the most valuable Respects, than any other in the *solar System*; and this System, for ought we know, not *inferior* to any in the *universal System*; so, if we should suppose Man to perish, without ever arriving at a more complete Knowledge of Nature, than the very *imperfect* one he attains in his present State; by *Analogy*, or Parity of Reason, we might conclude, that the like Desires would be frustrated in the *Inhabitants* of all other Planets or Systems; and that the beautiful Scheme of Nature would never be unfolded, but in an exceedingly imperfect Manner to any of them. This therefore naturally leads us to consider our present State of *Preparation* or *Probation* for farther Advancement: Which appears to have been the Opinion of the most judicious *Philosophers* of old. And, whoever attentively considers the Constitution of human Nature, particularly the *Desires* and *Passions* of Men, which appear greatly *superior* to their present Objects, will easily be persuaded, that Man was designed for higher Views than this Life. These the Author of Nature may have in Reserve, to be opened to us, at proper *Periods of Time*, and after due Preparation. Surely it is in his Power to grant us a far greater Improvement of the *Faculties* we already possess; or even to endow us with new *Faculties*. [For we know Things in our present or any State but according to our *Ways of Perception*; and our Knowledge and *Faculties*, in a new State, may be different, and the present be of no Use. We may perceive every Thing intuitively, in vast Plans of Ideas, or without external Ideas, by the Constitutions of Things; with a Power of not forgetting, and to assume *Faculties* or *Ways of Knowledge*, as suits our Purpose or Design; and of making extensive Comparisons and Conclusions; and may exist in a Form requiring no Nourishment or Supply of Substance, from Motion, as in our present mortal State of Being. Pal. Author.] Of which, at this Time, we have no Idea, for penetrating farther into the Scheme of Nature, and approaching nearer to Himself, the First Supreme Cause. We know not how far it was proper, or necessary, that we should not be let into Knowledge at once; but should advance gradually, that, by comparing new Objects, or new Discoveries, with what was known to us before, our Improvements might be more complete and

and regular ; or *how far* it may be necessary, or advantageous, that intelligent Beings should pass through a Kind of Infancy in Knowledge. For *new Knowledge* does not consist so much in our having Access to a new Object, as in comparing it with others already known ; observing its Relations to them, or discerning what it has in common with them, and wherein their Disparity consists.

Thus our Knowledge is *vastly* greater than the *Sum* of what all its Objects separately could afford ; and when a new *Object* comes within our Reach, the *Addition* to our Knowledge is the greater the more we already know ; so that it increases not as the new Objects increase, but in a much higher Proportion, *Cætera desiderantur.*

The IMPORTANCE of EDUCATION. *According to a learned AUTHOR.
Addressed to the Parents of Children, and Masters of British Schools.*

UPON the *Care and Conduct* of a right Education our present and future *Happiness* greatly depends. And a diligent and careful Attendance on our first *Impressions*, and on those made as we grow up, cannot be too strictly observed ; since the Mind is capable of distinguishing Good from Evil, and of fixing Habits, more early than is generally imagined. So that if *Virtue* be early represented to the Mind, in all its engaging and lovely Charms, it cannot fail to gain the young and innocent Heart ; and must necessarily have a *happy and lasting Influence* on the Rest of Life after. For *Custom* being a *second Nature*, when *Virtue* becomes familiar and habitual, the Practice thereof will be more pleasant and easy than the Practice of Vice ; For, according to the *wise Man*, *The Ways of Wisdom are Pleasantness, and all her Paths are Peace.*

The Cretans had so strong an Impression of the Influence of all Habits, taking deep Root in the human Mind, that they gave up a Man for lost, who was under the Dominion of a *bad Custom*. And Crates, the Theban Philosopher, used to cry out in the Streets and high Places of the City : *O ye People, why do ye toil to get Estates for your Children, when you take no Care of their Education ?*

Zenophon informs us, that the *Persian* Children, at School, were employed as diligently in learning the *Principles* of Sobriety and Justice, as the Youth in other Countries were employed at School in learning the literary Arts and difficult Sciences. That their *Governors* or *Teachers* used to spend most of their Time in hearing their mutual Accusations against each other, for *Violence, Cheating, Slander, Injustice, Ingratitude*, and other Crimes ; and taught them how to give Judgement against those who were Offenders.

The *Indian Gymnosophists* used to enquire of every particular Scholar, before Dinner-Time, How he had spent his Time since Sun-rising ? When some of them would answer, that they had been Arbitrators in composing *Differences*, and making Persons at Variance Friends with each other ; some, that they had been *executing* their Parents Orders ; others, that they had found out something *new*, either by themselves or others. But, if there happened to be any one among them, who had done no *good Thing*, or *Advantage* to others, since the Morning, he was excluded the Company of the Rest, and *obliged* to be employed in some laudable Task, set him, whilst the Rest of the Scholars were at Dinner.

The *Parents* used to authorize the *Master* of one of these public Schools to distribute the Value of six Pence apiece to his Scholars at certain Times in the Year, with Directions for them to lay out *one-third* Part thereof in *Charity*, and the Rest as they pleased ; and every School-boy was applauded or disapproved by the *Master*, according to the Use he found he had made of his Money.

An eminent Writer has observed on the *public Schools* of this Nation, (*where Christianity and Virtue should abound*), how *shamefully* the *Masters* of many of them

them neglect the forming the Minds of Youth to *Morals and Manners*. On which the great Mr. Locke thus takes Notice. "*That a Man must have a strange Value for Words, when the Languages of the Greeks and Romans are preferred to what made them such brave and wise Men; that can think it worth the while to hazard the Innocence and Virtue of his Son for a little Latin and Greek.*" As if *Language* (which is only the *Key to Knowledge*) had the Properties of *Excellence* itself!

If the Foundation of an Education is *rightly* laid, we provide, in the surest Manner, for our Childrens future Honour and Happiness; and take the best Method to render their Learning and extensive Knowledge in the highest Degree *graceful and beneficial*. We make their *Address* polite, their *Manners* ingenuous, refine their *Dispositions*, enoble their *Views*, and fit them for Society and Friendship. By these Means, their tender and susceptible Minds are guarded against those *Excesses*, and false Pleasures, which impair their Health and corrupt their Manners, and often to such a Degree, that they are never afterwards recovered to a due *Strength and Vigour* either of Body or Mind. Those therefore who are negligent herein may justly be termed *Barbarians*, alienated from the Feelings of Humanity, and hardened against the tender *Sympathies* of Nature.

Children should be instructed in the *Knowledge of an Universal Parent*, *prestiding over and governing all Mankind*; that they are bound to pay him the *biggest Reverence*; that they owe to him all their *Supports and Accommodations*, from their *first Existence*; that his *Government* is *mild and gracious*, and his *Punishments* *providential and necessary*, and for their *Benefit*; that he sees all their *Follies and Vices*; and that *what ever* they are afraid to do, or *indulge themselves in*, in the *Presence of their earthly Friends or Parents*, they should be much more *solicitous* to forego under the great Creator's constant Notice and Inspection, who is *Sovereign of the Universe*.

Another most necessary Duty, incumbent on Instructors of Youth, is, a constant Care to be *exemplary in their own Conduct*. "*Not to be luxurius if you expect them to be moderate. Not to be stiff and arrogant, if you expect them to be mild and condescending. Not to be given to Fraud, if you expect them to be just. Not to be narrow, partial, or selfish, if you expect them to be disinterested. ed. generous, and diffusively benevolent.*" If you be, vain are your Expectations, and certain will be your Disappointment.

It is a *Maxim*, too much inculcated and put in Practice, to *use strict Discipline and save spoiling the Child*. But a more prudent and just Rule in Education is, to *refrain from Severity*; thereby to *inspire the youthful Mind with sublime and generous Sentiments*. The Fear of *Shame* is so strongly implanted in the human Mind, (notwithstanding the Prevalence of *Vice*, and the strong Sense of it, which is almost universal), that it will, if properly applied, generally prevent the Practice of *Vice*. And the *Virtue*, thus produced, will be more *extensive, certain, and lasting*, in its Consequences.

In Cases of *invincible Obstinacy*, where all Address of Influence and Persuasion, and Motives of Fear and Shame, produce not a proper Conduct, it may be *justifiable* to use a severer Method, to prevent (if possible) the fatal Effects of *Excess* to the Offender himself, the Stain of his Family, and to *secure the Peace and Order of Society*. But Rewards should always be so mixed with Punishments, in their Contrivance and Proportion, as to nourish and strengthen the Sense of *Ingenuity and Honour*: The *Shame and Infamy* of the Punishment to be suited to *deter*; and the *Glory and Dignity* of the Reward contrived to *encourage*. And by *Reason and Argument* to convince Children that their Duty is their Interest; and, by *Kindness and Condescension*, Parents and others should influence those under their Care or Government to *love and confide* in them; as the *best and principal Means to secure their Obedience*.

To shew that Education should be made as delightful as possible, *Speusippus* caused the Pictures of *Love* and *Joy* to be hung round his School. For the same Reason moral and entertaining *Fables* and *Stories* (such as *Gay's Fables*, and select *Stories* from the *Spectator*) are subservient to that End; by pleasingly and insensibly leading the Reader to a *Love of Virtue* and *Abhorrence of Vice*, from some exemplary *Moral*. For Mr. *Addison* justly observes, that among all the different Ways of giving *Counsel*, the *finest*, and that which pleases the most universally, is the *Way by Fable*, in whatsoever Shape it appears. In reading a *Fable*, we are taught to believe that we are instructing ourselves. We peruse the *Author* for the Sake of the *Story*, and consider the *Precepts* rather as our own *Conclusions* than his *Advice*. If we look into ancient *Histories*, both sacred and profane, we find the wise Men of old very often chose to give *Counsel* to their *Kings* by *Fables*, as having the safest and surest Effect. It being a Truth, too evident, that more Persons are affected with what is *uncommon* and *surprising*, than what is *plain* and *familiar*, in what they read: The principal End of the *Author* in the striking and useful *Descriptions* and *Characters*, designed for the Reader to imitate, or avoid, being generally overlooked.

It would be of great *Advantage* to young Persons, to try their Judgements, if, when they read, they were asked their Opinion of any remarkable *Action*, or *Passage*; why they judge it to be good or bad; and how it might have been advanced to a greater Degree of *Perfection*. The *Example* of any particular Person should seldom, if ever, be recommended in the Gross; but should be noted where he excelled, and where he was defective. For Want of this *Caution* young Persons are often so dazzled with the Lustre of a great Character, that they confound its *Beauties* with its *Blemishes*; and look upon the faulty Parts of it with an *Eye* of *Admiration*! without separating, by Judgement, the one from the other.

NOTWITHSTANDING our having treated of the *Advantages* to be gained from any *Company*, for a short Time, by the *Prudent* and *Cautious*, (at P. 16 of last Year's *Palladium*, referring also to *bad Company*; see *Precept* 19, P. 17, *Pal.* 1769), frequenting *ill Company* and *Acquaintance* should be avoided, by Men of Reputation, but especially by the *innocent*, *young*, and *unguarded*, as *Rocks* by the *Mariner*. And too much Care cannot be taken by *Parents* and *Governors* to keep *Youth* from associating with *bad Companions*.

EFFECTS OF BAD COMPANY.

1. *BAD COMPANY* is ruinous to *Fame* and *Reputation*.
2. Judging Men look on others for the *Company* they frequent; according to the old Proverb, *Shew me your Company, and I'll tell you the Man*.
3. *Ill Company* often gives an incurable Wound to *Reputation*.
4. Revelling with *Prostitutes*, and parading with *Gamblers*, wert thou a *King*, thy *Reputation* could not be safe.
5. *Ill Company*, like *Objects* besmeared with Filthiness, besmear all those who come near or touch them.
6. *Ill Company* is the *Ruin* of *Youth*, and the *Reproach* of *Age*.
7. *Ill Company* is the *grand Engine* with which the *Devil* effects most of his *Purposes* on *Mankind*.
8. *Ill Company* is to be shunned as *deadly Poison*, or as a *Snare* laid for your *Safety* and *Welfare*.
9. Unavoidable and innumerable *Mischief*s and *Misfortunes* attend the keeping *bad Company*.

10. Many Men Have been good till they were *ill* associated.
11. Pure Water changes its Quality and Virtue by passing through *pernicious* Minerals.
12. When *Vice* runs in a *single Stream* or *Rivulet*, it is shallow and fordable; but when many of these vicious Streams fall and unite into one large and deep *Channel*, the *unwary* are drowned therein.
13. Good and wise Associates are like *Princes* in offensive and defensive Leagues against the common Enemy; one is a *Bulwark* for the mutual Safety and Protection of the other.
14. Bad Companions and Associates, like a *Jack o'Lantern* or *misguiding* Light, lead the *Unwary*, insensibly, into *Ambuscades*.
15. *Evil Companions*, like the *Sirens*, allure Men into dangerous *Follies* and destructive *Vices*.
16. He, who frequents *evil Company*, requires stronger *Antidotes* carried about him, than are carried by a *Physician* visiting his infected Patients.
17. It is *better* to have no Companion or Associate than to have an *ill one*.
18. *Acquaintance* is similar to *Commerce*, or Dealing of one Tradesmen with another; begun by Accident, continued by Custom or Inclination, and revocable, on either Side, at Pleasure.
19. When a Commerce of *Acquaintance* happens between two Persons, and is carried on to mutual Confidence; and if, through Inadvertency, either finds himself deceived in his Choice, by discovering the other to be *evil-minded*; he, by prudent and safe Measures, should shake him off as *St. Paul* did the *Viper*.
20. When *Esteem* is forfeited, *Acquaintance*, or even *Friendship*, is broken.
21. When a *Wife* forfeits her *Honour*, she forfeits her Husband's *Esteem*: Her Dependence is on the Law, and her Happiness to seek.
22. A *worthy* and *honest* Companion, of either Sex, is like a *Guardian Angel*!

MISCELLANEOUS AND MORAL OBSERVATIONS.

1. THE *Tyger* kills to satisfy his Hunger; but wicked and more cruel Man has often betrayed to Misery his *Protector*, *Preserver*, and *Deliverer*, for Gain.
2. Of so little Moment is Difference of Country for defining a Person's true Character, that the honest, tender, and generous Sentiments of a wild *Indian* have been found to surpass those in one of a *politer* Nation.
3. How weak the Charms, how *short-lived* the Triumph of *Beauty*, attended with *Pride* and *Insolence*! And how powerful and lasting the *Attraction* of a well-cultivated Mind, with a condescending, chearful, and obliging Behaviour!
4. Were Men to pay a more general Regard to real Worth, in their Choice of a Partner for Life, the *Fair Sex* would, doubtless, be more careful to adorn their Minds, instead of trusting so much to Dress and the fading Charms of their Persons.
5. The Force of true Wisdom is seen, in the *Practices* of Life, to restrain or change the worst Dispositions, though ever so strongly seated in the Constitution.
6. The *generous* Mind will never value itself upon what can make no Part of its Worth, but as it is worthily employed.
7. How requisite is a *liberal* Education, regular Conduct, and a just Sense of Things, to adorn a great Estate! — Were this *Rule* more generally observed, we should not so often see mean Spirits, and rude and ridiculous Behaviour, in Men of *Fortune*; whose Wealth only serves the more strongly to expose them to Contempt and Ridicule!
8. It is impossible for a Mind, untainted with mean interested Views, not to feel a Variety of Emotions, from seeing the worthy and amiable in deep Distress.
9. How

9. How *cruel* does that Tyrant appear, who arrogates to himself a Power over the Children to which he is *Guardian*; and *sacrifices* to his own grovelling Passion, and lucrative Views, their *real* Happiness! to promote which Happiness was the *real* Design and Limits of his Authority. Yet we find there are frequent *Instances* of such Men having existed.

10. How hard it is for a *bad* Man to divest himself of his fond Conceit of his own *Abilities*, when employed in a *bad Cause*! A moderate Opinion of ourselves is perhaps one of the last *Virtues* we shall attain to.

11. Of *how little* Value and Dependence are the *strongest* Professions of Love and Friendship, in a Heart *abandoned* to the wild Starts of Passion, flying from one Extreme to another!

12. It is *prudent* sometimes to smother Resentment, and even to repay *great Offences* with *great Benefits*. By these Means we may gain over a powerful and dangerous Enemy to become a faithful and sure Friend; as well as to enjoy the *Godlike* Pleasure of returning *Good* for *Evil*.

13. The *basest* Returns for the *greatest* Obligations raise a *Horror* in the honest Mind, shocking to human Nature! Yet we may learn, from the *exemplary* Danger of listening to *Temptation*, how soon it may seduce us to *listen* to what we most *detested*! For, he who can be *false* to his God, and can make his *Religion* subservient to his *Interest*, is not likely to prove true to his *Friend*.

14. This World, or State of Being, may be likened to an *Inn*, where one *Generation* is continually passing off, and another succeeding.

15. Let none, however insignificant he may think himself, imagine *that he is neglected by his Creator*. For every Station, as far as it is *providential*, is appointed by the most *consummate Wisdom*.

*Who sees with equal Eye, as God of all,
A Hero perish, or a Sparrow fall. POPE.*

16. There is scarce a *Passion* that gives a warmer *Glow* to the Heart than *Gratitude*: It is the Foundation of every *Duty* to God and Man; but cannot dwell in *contracted* Souls!

17. Kind and generous *Actions* often meet with Return, when long forgot by the *Doer*.

18. The *ill* Tendency of *Severity* to Youth, for little *Faults*, striking with *Terror* their tender Minds, is very obvious; as it puts them upon all Kinds of Shifts, or Arts of Evasion, to prevent Punishment: Thereby corrupting their native Honesty and Simplicity; which ought, as a *first Principle*, to be carefully cultivated and succoured.

19. Prudence and Patience are Remedies for the deepest Afflictions and Distress.

20. As we *treat* others, we may one Time or other expect to be *treated*.

21. The Folly of the *Hermetic* Art, and of stretching Life beyond its *usual* Date, is ridiculous, and contrary to good Sense.

22. What *Folly* and *Impiety* appear in some, who find Fault with the *Appointments* of infinite Wisdom! and would reform the *original* Constitution of Things!

23. *Mutual* Dependence of Station is necessary to preserve the *Beauty, Order, and Well-being* of Society.

24. A *compassionate* Action carries its own Reward.

25. In the Course of *Providence*, Occurrences, seemingly disadvantageous to us, prove *greatly* beneficial in the Event.

26. As we know not how we should behave in a *different* Station, it teaches us to be *satisfied* with the Station allotted us.

27. Those *Reproofs* do the most *Good*, given in the *least* offensive Manner; when, by some *distant Hint*, you make the *Offender* his own Accuser.

28. As we cannot limit the *divine Omnipotence*, so it is *fruitless* to busy ourselves in Speculations we can never clear.

29. All that is *necessary* for us to know of Truth and Duty, lies plain before us; and we can have no certain Knowledge beyond our real *Ideas*.

30. Mr. *Addison* observes in his *Speſtator*, (a *Library* of useful Knowledge for both Sexes) that we are not, at present, in a Situation to judge of the *Counsels* by which *Providence* acts, since but *little* arrives at our Knowledge, and even that little we discern but imperfectly. And those *Events*, the *Permission* of which seems now to accuse the divine Goodness, may, in the *Consummation* of all Things, both magnify his Goodness and exalt his Wisdom.

31. Moral Good and Evil are seen to be productive of all the Happiness or Misery in the World.

32. So *erroneous* is human Judgement, that granting our Wishes would, sometimes, be the greatest *Cruelty* done to us.

33. We behold different Nations equally ardent in praying to Heaven for each other's Defeat or Destruction; instead of resigning the Merit of their separate *Causes* into God's Hands.

34. A *Reliance* on divine Providence, and ascribing our Successes to God's Power, is the only sure Way to engage his Protection; and to gain that *Firmness* of Mind which Nothing else can afford. For He, who holds the *Universe* in Dependance and Existence, can easily avert the most hidden *Mischief*; and, by *unforeseen* Causes, turn it upon the Head of the Contriver.

35. To Him who formed us all of one Clay, it is seen in many Instances that the Life of the *meanest Slave* has the same Protection as that of the *greatest Hero*, and is as providentially guarded.

36. The wise Author of Nature has so ordered the Constitution of the human Mind, for the mutual Happiness and Preservation of the human Species, that the *pure Joys* of *natural Affection* for our Children give us a Delight hardly to be equalled. How *greatly*, therefore, are those their own Enemies, who suffer their *vicious Passions* to interrupt or *totally* destroy these solid Enjoyments, and those of Friendship!

37. One Crime, committed with Impunity, leads to the Commitment of a greater, till the Hopes of *Concealment* terminate in Remorse and Punishment!

38. An overbearing and insolent Disposition always deserves and often meets with humbling Circumstances.

39. Happy is that *Disposition* which is brought to a just Sense of its own Demerits.

40. We learn, from visible Instances, how great an Injury those Parents do to their Children, who breed them up in a Way they are not likely to support.

41. As we know not how soon a *Reverse* of Fortune may set our Inferiors above us, we should learn from thence never to behave *disdainfully* to any.

42. A *fixed* or *well-grounded Esteem* often rises superior to *ill Usage*; and rejoices at an Opportunity of shewing itself, when the Conduct of an *Ingrate* is altered.

43. An infinite Disproportion or Difference is seen between a Tyrant governed by his cruel Jealousies and raging Passions, and a Mind tempered with *Wisdom* and *Benevolence*. The Horrors of the one *illustrate*, by Contrast, the Beauty and Amiableness of the other!

44. The haughty *Oppressor* is often dealt with deceitfully; his Cruelty furnishes his best Friends with Arts to evade his Power.

45. Among well-instructed Minds, we see *Grandeur* make no Part of real Happiness.

46. How dreadful a Temptation is extreme Poverty! but borne with Resolution and Patience; Innocence is a happy State, when compared to any Relief of it purchased by *Guilt*, and the Reproach of a bad Conscience!

47. What a commanding Awe is *Virtue* seen to have over the *vicious Heart*, when it checks the flushed *Libertine*, in the Height of his promised Pleasure, from destroying *Virgin Innocence*!

48. He becomes a *Victim* to Repentance, and a *Guardian* and *Rewarder* of *Virtue*, when he preserves those Charms he was about to destroy!

49. From the *Immorality* of Servants, derived from *Example* and *Negligence* of Masters of Families, having the Care of them, flows that irresistible Torrent of *Misfortunes* which spreads through all Ranks of Life.

50. Old Age, by Means of ill Example and Immorality, is oppressed with Beggary; Youth are drawn into the Commitment of Murthers and Robberies from the same evil Cause.

51. If we consider the Happiness which results from a fatherly Conduct of Masters towards Servants under their Inspection and Notice, it would encourage every moral Man to use his Influence towards their Well-doing, instead of exercising a *Libertine* Behaviour, so pernicious and frightful in its Consequences!

☞ *As one uniform and rational Religion, established in any Country, is the Support of its Strength and moral Character, whatever Religion therein practiced deviates widely therefrom, produces Dissention, Weakness, and national Depravity; the Members of such absurd Notions in Religion are the Pest and Scandal of Society.*

Of FANATICISM, ENTHUSIASM, and Religious PHRENSY, as practised at this Time in Tabernacles, Conventicles, and private and public lunatic Assemblies, in the British Dominions.

THERE is no Pitch of Folly and Phrensy of which the human Soul is not capable in Matters of Devotion; and none but he who made it, and raised it above the Soul of a Beast, can set it free from Error, and above Superstition. *Independent Whig, Vol. III. P. 18.*

Non potuit celare pie ludibria fraudis. BUCHAN.

The daily Experience of sensible People in this Country, where a *Party-Spirit* in Religion prevails, makes it necessary to observe that,

Humanum est errare et insanire,

is an *Adage* founded not only on what is done in the *British Empire*, but on the universal Experience of Mankind. And we are all of us willing to acknowledge the Truth of it, however we doat upon our own Delusions.

To run through all the monstrous Follies of enthusiastic Devotion would require Volumes to be written the whole World could not contain.

A few Observations on the mad-headed *Seftaries*, and hypocritical Pretenders to extraordinary Piety, in the *British Dominions*, of the *Dupers* and *Duped*, in the Departments of *Madness* and *Disimulation*, will be sufficient to convince all rational Minds of their monstrous Absurdities!

To begin with a Quotation from an ingenious Author on the Subject, who is a true Friend to pure Christianity, unmixed with absurd Forms and Species of worshipping the Great Being, he accounts for the superstitious Forms it assumes, and the various Effects of *Entbusiasm* upon Mens Minds, as follows.

Entbusiasm (says he) is a full Persuasion that God inspires us, while it is *Imagination* only that deludes us into that Belief.

This *enthusiastic* Opinion arises generally from an *Excess of Self-Love and spiritual Pride*, which delude Men to fancy themselves more enlightened and more virtuous than others. It attaches itself to its own wild Notions and *Pharisaical* Sentiments, as the Standard of Truth and Holiness. And this

Presumption

Presumption makes Men go out of their Senses, under a specious Pretence of enlightening and reforming others.

When once this *enthusiastic Madness* wanders abroad, it disturbs the *World* with its *infectious Contagion* ! It disturbs both human and sacred Societies ; and, according to the natural Complexion and Station of the Person it infects, it is productive of Rage, hot Dispute, and revengeful War !

When it seizes upon Persons of a *melancholy* and *whimsical* Humour, it produces *Raptures*, *Extasies*, *Visions*, *Quakings*, *Agitations*, *epileptic Fits*, *Phrenesies*, and *Convulsions* ; with other strange *Phænomena*, attended with extravagant and *blasphemous* Expressions !

When it *actuates* fiery, hot, choleric, Complexions, it fills their Minds with spiritual Passions, blind Zeal, impetuous Animosity, devout Hatred, direful Persecution, and disdainful Revolt.

When it *infatuates* a sanguine, lively, and vigorous Constitution, it begins with the *Spirit*, and ends with the *Flesh*. It pretends at first to enlighten, reform, and spiritualize its Disciples ; but, by Degrees, it degenerates into *Lewdness*, *Imprudence*, *Wickedness*, and *Folly*. See *Ramsay's Philos. Principles of Religion, natural and revealed*. B. VI. Vol. I.

A NEW PLAN for the more speedy Attainment of CLASSICAL LEARNING,
Addressed to the TEACHERS of the BRITISH YOUTH. By CLASSICUS.

THE prodigious Labour attending the Acquisition even of a moderate Knowledge of the *Classics* has been, Time immemorial, a just Subject of Complaint. *Rudiments* bear a frightful Aspect ; and we are scarce willing to accept of the *Fruit*, if it must be purchased at the disagreeable Expence of climbing the *Tree*. Many a gallant *Adventurer*, who would have been happy to have met *Cæsar* in the Field, has been dismayed at the grim Visage of *Priscian*, charging him in *Front* with a Regiment of terrible *Declensions*, *Conjugations*, and *Rules* ; and, in the *Rear*, with a Host of as terrible *Heterochites*, *Irregulars*, and *Exceptions*. A total Removal of these *Evils* is more than can be expected, because it is an Impossibility ; but a *Diminution* of them may be the Work of *Sagacity*.

That there are two *Extremes* in every Thing, *too much*, and *too little*, is a Truth that is invariable and universal. *Grammatical Studies* have come in for their Share in these *Extremes*, and, in this *Idea* alone, furnish no *Exception*. By *some*, Opportunity for Application is not afforded ; and the Memory is loaded with more than it has the *Faculty* to digest ; whilst *others* are for denying it Matter sufficient to work upon, and for leaving the *Pupil* to solve Difficulties and make a *Grammar* from his own Brain, when he ought to have it done ready to his Hands. To steer clear of these two *Errors* should be our Aim ; as to make *Memory* and *Application* keep Pace together is all that we have to do.

It has been an established *Custom* in *Schools* to keep Pupils trudging on in learning a tedious *Grammar* by *Rote*, for a Year or two : And, perhaps, whilst they are very young, as they scarce possess any other Faculty than that of *Memory*, their Time does not admit of being better employed ; it being certainly more properly expended so than in roasting a *Cobler*, or robbing an *Orchard*. But the Case is altered when we have Scholars of riper Judgements to deal with. Such are supposed capable of applying and digesting what they learn. As soon as they know only the *Declensions* and *Conjugations*, and have read the *Rules*, they ought immediately to attack some easy *Author*, and enter on real Business.

And here it may not be amiss to suggest a more *speedy Method* of knowing more effectually the *Declensions* and *Conjugations*, than the common one of learning

learning them by *Rote*. Such a *Notion* is not chimerical, and *Experience* has confirmed the following *Scheme*.

Instead of humming over *Musa, Musæ, Musæ, Amo, amas, amat*, let the *Learner* write down every *Article* as confusedly as possible; mixing *Nouns* and *Verbs*, *Singulars* and *Plurals*, without *Connexion*, (as *amat, honoris, legam, amo, regni, &c.*) and then let him *parse*, and find them out, as well as he can, by the *Help* of his *Grammar*; till he knows them all. This *Method* will cost him but *few Days*, and he will know them much more readily, when asked, than if he had them perfectly by *Rote*, in the common *Order* and *Form*.

When he has done this, let him proceed to reading over the *Rules* of his *Grammar* attentively, without learning it by *Rote*, and find out those *Rules* when he has begun an *Author*, as he found out the *Declensions* and *Conjugations*. He will by this *Practice*, in a little *Time*, more firmly *ripen* them in his *Memory* than he possibly can by learning by *Rote*, and be perfectly able to apply them. Learning by *Rote*, without applying at the same *Time*, is like *swallowing Food* without *digesting* it.

As to *Choice* in *Grammars*, the shortest *Abridgement*, which contains only the leading *Rules*, *Declensions*, and *Conjugations*, should be chosen at first to prevent *Disgust*: Such as *Ruddiman's Rudiments* for the *Latin* Tongue, and the *Eton Grammar* for the *Greek*.

After the *Contents* of these are known and applied, *Barclay's* copious *Latin Grammar* will be proper, to instruct the *Scholar*, more completely, in some more refined *Niceties* in the *Language*, which could not be comprized in an *Epitome*: And *Dr. Busby's Westminster Grammar*, for *Greek*, may be taken in *Hand*, to complete him in that *Language*; which is a *learned, critical, and elaborate Performance*; forming almost a complete *System* for the *Language*; and wants only a *short Plan* of the *Dialects*, to render it *universal*; which it is surprizing the *Doctor* omitted: However, that *Omission* is supplied at the *End* of many *Lexicons*, and therefore needs be the less regretted.

What we do with *Pleasure and Satisfaction*, it is generally presumed, we do well. A very *gradual Succession*, from the most easy to the more difficult *Authors*, should be made, in *Order* that the *Pupil* may not be disheartened. It is difficult to assign a *Reason*, why the *Poets* are so soon put into the *Learner's* *Hand*, as they generally are. When he has the *common Rules* and *Construction* yet to combat with, why is he to be farther *embarrassed* by poetical *Transpositions* and *Licenses*. These he should let alone, till he has *digested* and perfectly *understands* the former. In aiming at too many *Points* at one *Time*, like the *Dog* in the *Fable*, we are liable to miss them all. There are no *Beauties* in them to smoothe the *Way* till he understands the *Language* tolerably well; and *Prose Authors* are the proper *Standard* for *Style*. Before he learns the *Language* of the *Gods*, let him be content humbly to know that of *Men*; to talk the common *Dialect* before he spouts in *Heroics*.

Some *Teachers* are very apt to introduce their *Scholars* early into *Terence*; when they might with as much *Propriety* begin with *Lycophron's Cassandra*. The *Style* is frequently *antiquated* and *idiomatic*; many *Places* are troublesome even to *Proficients*: the *Wit* and *Humour* are lost on a *Learner*; and the *Measure* of the *Versè* is a *Task* for *Bishop Hare*, or *Procrustes* himself, to undertake.

Sententiæ Pueriles, or *Corderius's Colloquies*, for *Latin*, are best to begin with; then the *Latin Testament*, *Justin*, *Q. Curtius*, *Cornelius Nepos*, *Cæsar's Commentaries*, or *Tully's Offices*. The *Greek Gospels*, for *Greek*, (not the *Epistles*, for they are more difficult), are best to begin with, because they are easiest; then *Tabula Cebetis*, *Isocrates's Works*, and *Xenophon's Cyropædia*, in the *Order* they here stand in. After these are read and understood, it is almost indifferent what other *Authors* are pitched on to succeed: And the *Scholar* now may be allowed to undertake the easy *Poets*, such as *Phædrus*, *Ovid*, and *Virgil*, *Latin*; *Anacreon*,

Anacreon, Homer, and Hesiod, Greek; or to proceed to the more difficult Prose Writers; such as Tacitus, Livy, Sallust, Latin; Demosthenes, Aristotle, Lucians &c. Greek.

Next to these may come the *Greek Minor Poets and Tragedians, and Aristophanes's Comedies*; the Works of the *Roman Satyrists, the Poems of Lucan, Statius, &c.*

If the *Learner* begins very young, and has many Years of Teaching to come, it is not here meant that all *Profody* should be neglected; but, if any Thing must be omitted, certainly that is the *least* necessary Part of a *classic Education*: And what is above offered is penned with a View of taking up as little Time as possible.

Nor is it *necessary*, if our *Pupil* has a Desire to learn, and is past the first School-Discipline, to have his *Instructor* always at his Elbow. In reading his Authors, after he has acquired some little Knowledge of them, he may mark his Difficulties with a Pencil, where he finds them *insurmountable*; and ask an *Explanation* of them as Opportunities offer.

To sum up the whole *Drift* of this our *new Plan* in a few Words, the Scholar should not be left to form *Conjectures* of his own when *Information* can be given him; nor should he be overloaded with *Rudiments* till his *Understanding* is overwhelmed in Confusion.

CLASSICUS.

✍ We cannot recommend a more useful Production to our Correspondents in general, for their *Entertainment* and *Improvement* in several INTERESTING SUBJECTS, than a *Work*, lately published, entitled PERIGRINATIONS OF THE MIND through some of the most INTERESTING SUBJECTS. By the RATIONALIST. Printed for G. PEARCH, Number 12, in Cheap-side, London. Price bound Three Shillings,

PALLADIUM-AUTHOR.

PART II.

ANSWERS to all the ÆNIGMAS in last Year's PALLADIUM.

- | | | |
|-----------------|--------------------|-----------------|
| I. A GOOSE-PYE. | IV. A DAMASK-ROSE. | VII. A BUFFOON, |
| II. A MANGER. | V. The TIDE. | or STROLLING- |
| III. A SHEEP. | VI. TWO SAWYERS. | PLAYER. |
- Prize, TWO PRINTING-BALLS.

All the ÆNIGMAS answered by the Reverend Thomas Vaughan, of Morpeth.

AS walking, the other Day, by the Sea-Side,
I found several Things cast on Shore by the Tide; 5.
As Sheep, Damask, and Puppets design'd for a Show; 3. 4. 7.
Sawyers Plank, Printing-Balls, with a Manger also; 6. Pr. 2.
A Goose-Pye was landed, which some think good Meat, 1.
And salt Beef and Pork, — such as Sailor-Folks eat.

Mr. W. Wells, of Crowle, answered the 3d, 4th, 5th, and 6th.

The ÆNIGMAS and REBUSES answered by Gemini, of Morpeth.

To the PALLADIUM-AUTHOR.

Permit me to enter the PALLADIUM OF FAME,
I'll do my Endeavour to merit a Name;

Of Goose-Pyes, and Mangers, and Lambs, will I write; 1. 2. 3.
 Nay, will shew you Friend *Punch*, if in him you delight. 7.
 Of Engines and *Sawyers* I'll try next to sing, 6.
 And of fragrant red *Roses* that shoot in the Spring. 4.
 The *Tide* to my Verses I for you will devise; 5.
 Play at *Balls* with Miss *Stow* — and so aim at the *Prize*!
 Of *Ashton* and *Bentley* I next mean to tell, 1. & 2. *Rebus*.
 To see them at *Foxton* would please me quite well; 3. *Rebus*.
 For at *Yearum* or *Stilton*, perhaps, I may'nt be, 5. & 6. *Rebus*.
 And *Canterbury's* City is Nothing to me. 5. *Rebus*.
 Th' *Ænigmas* and *Rebuses* now will appear;
 Accept of these Answers — I'll send more next Year.

Mr. Stuckfield, of Stepney, answered the 5th ÆNIGMA thus:
 BY *Gravitation's* Power, (all Nature's Guide),
 The Planet *Luna* rules the rolling *Tide*.

Mr. Swift, of Stow, answered the 1st, 2d, 3d, 4th, and 5th Ænigmas in Verse. The Prize-Ænigma was answered by Mr. George Coughron, of Wreigh-bill in Northumberland; as also by Mr. W. Oliver, of Beamister. Mr. Stephen Hartly answered several Ænigmas in Verse, we have not now Room for,

Mr. George Newland, of Mr. L. Nickolson's School in the Isle of White, answered the Prize-Ænigma, and also the 5th.

The PRIZE-ÆNIGMA answered by Mr. William Swift, of Stow.

AS I of late Miss *Stow* pass'd by,
 I heard her, in a Fit, to cry,
 My *Ashton's Balls*! — And, I suppose,
 His *Printing-Balls** she meant by those.
 * *With which Printers lay on their Ink.*

Mr. John Buddle, of Kyo, Durham, answered the Prize-Ænigma, by Slack's Puffs, at his Printing-Office, Newcastle, which he happened to see.

A New HUNTING-SONG, answering all the ÆNIGMAS, by Mr. T. Sadler,
 I.

THE bright *Rosey* Morn bids the Huntsman prepare 4.
 The Hounds to uncouple, for hunting the Hare;
 The Sportsmen all ready, he mounts his bay Steed,
 The Chace to pursue, over Hill, Dale, and Mead!

II.

Enlivening Sounds and loud Ecchos arise!
 And the Woodlands resound with the glad Hunters Cries!
 Poor Puffs, in Affright, stretches over the Lawn,
 While the Horn and the Hounds sweetly chorus the Morn!

III.

Now *Pye-bald*, and *Lamb-tide*, and *Typer-man*, they, 1. 3. *Prize*.
 Fly swift as the *Wind*, or a Bird from the Spray; 5.
 And *Ranger*, and *Manger*, and *Player*, forth Spring! 2. 7.
 And *Ringer* and *Springer*, all make the Woods ring!

IV.

Now *Watcher* and *Joiner*, quick-scented, pursue;
 And *Sweeper* and *Sawyer*, with Hare full in View! 6.
 The opening Pack lead the Sportsmen away,
 Over Hedges and Ditches, so jovial and gay!

D

V.

V.

With the Sports of the Day, in the hunting the Hare,
The Joy of the *Chace* bids adieu to *old Care*!
Bright Phœbus, declining, the Hills tips with Gold,
Invites the gay Sportsmen their Sports to withhold.

VI.

Poor Pufs being taken, the Sportsmen retire,
Well-warm'd, and elate with an emulous Fire!
The Guardians of Pleasure enliven the Soul,
The Bottle and Glafs, and a full flowing Bowl!

VII.

How happy the Sportsmen, who, Strangers to Strife,
Enjoy ev'ry Day the gay Pleasures of Life!
May Health, Peace, and Plenty, with Music, abound,
And crown all our Joys with the Cries of the Hound!

VIII.

Come, fill up a Bumper, and round let it pass,
In a Health to the Sportsman, and beautiful Lass,
Gay, witty, good-humour'd, respondent, and free,
Adorn'd with the Laurel of dear Liberty!

ANSWERS to the QUERIES in last Year's PALLADIUM.

I. QUERE 206, answered by Oedipus, to Miss Stow.

THE Language of a Cupid's Dart
Will win and fix the *Virgin* Heart.

II. QUERE 207, answered by Amanuensis.

AS Mr. *Ashton* tells us (supposed from his *Dictionary*) that *Alfred* divided the Kingdom into *Sbires* and *Hundreds*; if Mr. *Sadler* will look into his *Dictionary*, he will see who divided the Kingdom into *Parishes*.

III. QUERE 207, answered by Oedipus.

From *aboo*, supposed to be an *Anagram*, being an unknown Language, makes *Abocrom* by Transposition; which, by *Corruption*, may signify the *Abercromby* Family of *Scotland*, from whence might spring the Duke of *Leinster's* Family, and thence the *Motto*. For Dean *Swift* discovered, that the *Greek* and all other Languages may be derived from the *Scotch*: Shewing us, that the *North-Britons* are Part of the original People.

IV. QUERE 209, answered by Oedipus.

HAD the *Conception* of *Christ* been placed on the 25th of *March*, or on what is usually called *Lady-Day*. and the *Birth* of *Christ* on the 25th of *December* following, about nine Months asunder, between the *Conception* and the *Birth*, according to what is observed to happen in the *Production* of the human *Species*, (to which *Nature* *Christ* was translated from the *divine Essence*), the *Time* of *Pregnancy* would have appeared more consistent with the other Parts of the *Gospel*. But why the *Conception* should be placed on the 8th of *December*, and the *Birth* on the 25th of *December*, following or preceding, (who can tell us which?) making 17 Days, or a Year wanting 17 Days, in the *Time* of the *Pregnancy*, our *Divine Legationists*, and *Alterers* of *Greek* from its original *Propriety*, must resolve, as their proper Province of unfolding profound *Mysteries*.

V. QUERE

V. QUERE 210, answered by Britanicus.

PERSONAL IDENTITY in one's-self is distinguished by *Self-Consciousness*; for I know by Nothing else that I am the same Person that I was since I can remember: But in other Persons it is distinguished by concurring *Circumstances* of *Place, Time, Things, &c.* joined to a *Name* or *Names*, for ascertaining the Person intended, in Writing or Speaking of another. Though we swear to another's Person, once known by his *Marks* of Identity or Sameness of Person, and not *Likeness*. When a *Name* or *Names* are only specified in Writing or Speaking of another, without *Things done by him*, and other concurring *Circumstances*, relative to the *Identity* of that Person, or of *Facts* done by him, the *Evidence* can only be imaginary, or *Opinion*: And, instead of giving Truth, will serve only to furnish a *Law-Controversy* with fallacious Conclusions. For, as Mr. Locke observes, *Words*, in their *unsettled* or *unlimited* Signification (as in the Case of *Names* before us) may [in the *Law*] signify any *Thing*, or *Nothing* at all.

VI. QUERE 211, answered by Oedipus.

AN invalidated Understanding, and a weak Body, (in the Scotch Phrase), imply the same Sort of *poor Things*! and are therefore alike to be pitied! Like a *Charity-School Teacher*, and a *Smatterer* in Mathematics, weak enough, through Vanity, to criticise Works of *Eminence*, they never understood; like the *Damnonium*, (as he styled himself), and *Library Hall Professors, Exoniensis, &c.* As to *Folly*, (separately considered), it is a greater Misfortune than *Ignorance* by itself, which would often rest satisfied; but, being stirred up by *Folly* in the same Person, it is prompted to assume a false *Eminence*, which is attended with *Contempt, Ridicule, and Disgrace*; and so *Folly* becomes a greater Misfortune than *Ignorance* to the same Owner. *To be ignorant and innocent are pitiable! to be ignorant and vain, despicable!*

VII. QUERE 212, answered by Hermes Trismegistus.

Addressed to Card-bill Authors, unfashionable Teachers and Spellers, open Letter-Writers (unrequested), and their Abettors.

Ecce iterum Crispinus.

ON the Subject of Lying, *Hudibras* says to *Sidrophel*, (*Heroical Epistle, L. 105*), as follows.

Alas, that *Faculty* betrays
Those soonest it designs to raise;
And all your vain *Renown* will spoil,
As *Guns* o'ercharg'd the more recoil;
Though be that has but *Impudence*,
To all *Things* has a fair *Pretence*;
And put among his *Wants* but *Shame*,
To all the *World* he may lay *Claim*.
But all *Impostors*, when they're known,
Are past their *Labour*, and undone.

Giving *Truth* to a Person who wants it, is taking so much of his *Error* away from him, that he before had. Now, suppose you put *Shame* among his *Wants*, (*Want of Truth, Ability, &c.*) according to the *Text*; so that *Shame* may be one of his *Wants*, and, by his possessing *Impudence*, he may then lay *Claim* to any *Thing*. In this Sense, contrary to the former, by giving him *Shame* among his *Wants*, you furnish him with *Want of Shame*; and he having no *Shame*, you furnish him with a *Negative*, instead of taking one that he had (*Want of Shame*) away.

PRIZE-QUERE answered by Mr. William Hardy, of Cottingham-School, near Hull.

By a few Trials, x is found near 3, and y near 2.

Let $x = 3$, then y will be found nearly $= 2.1257$ from 1st Equation.

Again, let $x = 2.8$, then y will be nearly $= 2.08796$ from 1st Equation.

Whence, by substituting their Logarithms in the second Equation,

$\overline{.4771213} \cdot 3275020 + \overline{.3275020} \cdot 4771213 = 1.372046$, which should be 1.374971 ; therefore the Error is .002925, too little.

Again, from the Logarithm of 2.8, we have $\overline{.4471580} \cdot 3197222 + \overline{.3197222} \cdot 4471580 = 1.373673$, which should be 1.374971 . Whence, the Error is .001298 too little.

Divide the Difference of Products by the Difference of Errors, being now alike: [But the Sum of Products by their Sum, when unlike.]

Hence, by the Rule of False, or Cross-Multiplication, of the 1st Supposition by the second Error, and the second Supposition by the first Error,

$$\frac{3 \times 0.001298 \text{ Dif. } 2.8 \times 0.002925}{0.001298 \text{ Dif. } 0.002925} = \frac{.004296}{.001627} = 2.64, \&c. = x; \text{ and,}$$

by another Supposition or two, x will be found $= 2.5$ Furlongs; and, consequently, $y = 1.9$ Furlongs, accurately.

For, If $y = 1.9$; $L.y = .2787536$; $L.L.y = 9.4452204$.

$x = 2.5$; $L.x = .3979400$; $L.L.x = 9.5998176$.

$$\left. \begin{array}{l} y^x = 4.9760423; x^y = 5.7027713 \\ \overline{L.y} \cdot L.x = 0.6014935; \overline{L.x} \cdot L.y = 0.7734775 \end{array} \right\} \begin{array}{l} x^y - y^x = 0.726729 \\ \overline{L.x} \cdot L.y + \overline{L.y} \cdot L.x = 1.374971, \text{ req.} \end{array}$$

Hence, $1.9 \times 2.5 = 4.75$ square Furlongs $= 1.9 \times 40 \times 2.5 \times 40 = 7600$ square Poles, or $47\frac{1}{2}$ square Acres, exactly, the Area of the required Parallelogram.

Anti Hattoniensem.

The Author of the Card-bill, sent us unrequested, concerning which this Quere was proposed, has omitted, in his Bill, (among other curious Particulars), Where Spelling, Reading, and Writing, English, are properly taught. Who spells Lieutenant for Lieutenant, in the new Fashion; and vindicates it by saying, "It is of a Peice [for Piece] with the Rest."—Other Anecdotes hereafter, concerning a new Set of Authors.

ANSWERS to the REBUSES in last Year's PALLADIUM.

I. ASHTON.

III. FOXTON.

V. YEARUM.

II. BENTLEY.

IV. CANTERBURY.

VI. NOXTON.

All answered by the Rev. Mr. Thomas Vaughan, M. A. of Morpeth.

VAUGHAN's Rebus is Bentley, without any Doubt, 2.

Canterbury and Foxton both St. John's make out; 4. 3.

Then Yearum and Ashton do Bailey's disclose, 5. 1.

And Noxten Brown Ashton's is, I do suppose. 6.

Mr.

Mr. Thomas Stuckfield, of Stepney, near London, answered the second REBUS thus.

BENTLEY you'll find to be the Name,
That lifts the Author into Fame.

The same Correspondent thus answers the third REBUS.

THE Fox a cunning Thief is known;
Display'd his Tricks at Fexton Town!

Mr. Swift, of Stow, answered the 3d Rebus in *British-Oracle* Verification. Which Oracle is now dumb! For, having spoke about ten Times, it grew silent in March, 1770.

When all its Wisdom — such as heretofore,
Forbore to charm — and could be heard no more!

Mr. George Newland, at Mr. Nicholson's School in the Isle of Wight, answered the 4th Rebus in Verification.

Mr. George Coughbron, of Wreighbill, answered the 2d, 3d, 4th, 5th, and 6th Rebus.

ANSWERS to the PARADOXES in last Year's PALLADIUM.

I. SELF. II. Mrs. PIG bringing forth 3 Children, being PIGs after their Kind, each of whom had 2 Calves.

I. PARADOX answered by Mr. Richard Dalton, of Pool.

PIG the Wife's Name must display,
To whose Children, if three,
Six Legs there must be,
And six Calves to those Legs will convey.

Mr. William Wells observes, that as there are Surnames answering to every Kind or Species of Animals, Pig must be included among the Rest.

II. PARADOX answered by the Rev. Thomas Vaughan, A. M. of Morpeth.

I question if Pig was in Humour for Mirth,
When his Wife brought him forth three, and all at one Birth!

Mr. George Newland, of the Isle of Wight, answered the same.

Mr. William Wells, of Crowle Free-School, Lincolnshire, answers the two PARADOXES thus. Addressed to Miss Polly Stow.

I.

DEAR Miss, take of your Self due Care, 14
Now Swift is turn'd Deserter;
Your Wit the brighter will appear,
When he has caught a Tartar!

II.

Billy's, like Tommy Pig's dear Wife, 2.
Shall bring the Bantlings forth;
But you, dear Miss, shall with new Life
Teem with exalted Worth!

III.

III.

Your Complaints for Damon, lost in War,*
 Our Hearts did overcome;
 But Billy soon, † without a Scar, ‡
 Did bring your Lover Home.

* *Palladium*, 1770, P. 25, Debtor.

† *Gentleman's Diary*, 1770, P. 24. *per contra*, Creditor, 3 Years absent in Peace.

‡ *Quere*, Why were both these Compositions (altered by different Refiners) sent to different annual Publications at the same Time? The *Latin* for *Goose* is *Anser*.

Mr. Thomas Stuckfield answered the second *Paradox*, as did Mr. W. Oliver of Beamister. — Mr. W. Roberts, of Greasborough, Mr. Stephen Hartley, and Mr. G. Coughron, answered the *Paradoxes*.

ANSWERS to the QUESTIONS in last Year's PALLADIUM.

I. QUESTION 401, answered by Mr. Richard Dalton, of Pool, an early Contributor.

IT is evident, by *Question*, that w is equal to some whole Number, less than

$\sqrt[3]{57}$, and the next whole Number to which is equal to 3; the next less to

$\sqrt[3]{2763} = 14$; to $\sqrt[3]{1353} = 11$; to $\sqrt[3]{153} = 5$. Subtract the two first Equations from the last, and $w^3 - w = x^3 - z - 3 + a$, $x^3 - x = z^3 - z - 3 + b$: Now, having the greatest Limits of w , x , y , and z , to be 3, 14, 11, and 5, the Numbers, from thence, are easily found. Suppose $w = 2$, then $z^3 - z$

$= 102$; here z is greater than $\sqrt[3]{102}$ a whole Number. Therefore z must $= 5$, and $w = 3$. Here w and z being known, x may be determined by *Approximation*, or otherwise, $= 14$: Whence, y is had, by Transposition, $= 11$. Consequently, the Lady's Name, who has no Equal, is found to be COLE, required.

The same answered by Mr. Stephen Hartley, of Sowerby-Bridge.

THE Difference between the 1st and 2d Equations is $x^3 - x - w^3 + w = 2736$; shewing that w cannot be more than 3; put it $= 3$, whence $x^3 - x = 2730$, and $x = 14$. From 1st Equation, $y + z = 16$; and from 4th, $y + z^3 = 136$, their Difference is $z^3 - z = 120$, whence $z = 5$, and $y = 11$: So that

She who no Equal has, from Pole to Pole,

Must be the matchless Fair, whose Name is COLE.

Mr. Gemini of Morpeth, and also Mr. William Maruden of Netherburst near Hathersage, Derbyshire, solved it.

Mr. Thomas Adcock, of Ashby de la Zouch, sends us this Couplet.

Matchless COLE is the Fair whom no Fair can excel,
 With whom all the Virtues and Graces do dwell.

Mr. George Hicks, Teacher of Reedness Free-School, Yorkshire, solved it in a similar Method to Mr. Dalton's. Mr. William Wells, of Crowle, Lincolnshire, solved it by a Table of Cube-Roots, in whole Numbers, to given Cubes, answering to all the Places, or Cube-Roots, in the Alphabet. — Mr. John Eddle, of Kyo, near Lancheffer, in the County of Durham, (a former ingenious Correspondent) determined the Lady's Name, as above, by a short Deduction; as did Mr. William Turner, Teacher of Mathematics, at Whitney, Oxfordshire,

Mr.

Mr. *Alexander Rowe*, of *Reginnis, Cornwall*, like Mr. *Robinson*, of *Biddick*, solves this, and most of the *Questions*, in a concise and masterly Manner.— Mr. *R. Judson*, of *Beverly School*, observes the same as Mr. *Dalton*, above, and so does Mr. *William Pen*, of *Chalfont*; Mr. *W. Roberts*, of *Greasbrough*, near *Rotterdam*; Mr. *Jonathan France*, Schoolmaster, of *Hope, Derbyshire*; Mr. *Thomas Atkinson*, of *Ingham*; and Mr. *Draper*.

Mr. *George Coughron*, of *Wreighbill, Northumberland*, answered this *Quest.* by finding the Values of x , y , and z , by *Cubics*, in Terms of w , substituted them in the first Equation, in three formidable uniform radical Expressions, whose Sum he made $= a$. Whence he found $w=3$, and x , y , and z , 14, 11, and 5; and the celebrated *Lady's Name*, COLE. Who refers to the former *Methods*, however, as preferable.

II. QUESTION 402, answered by Mr. Richard Dalton of Pool.

PUT $m^2=x$, and $n^2=y$, $62510=a$, $250005=b$: Then, $m+m^2n^4=a$; and $n+m^4n^2=b$, per *Quest.* Hence, $\sqrt{bn^6-n^7} + 4\sqrt{\frac{b-n}{n^2}}=a$, where

$n=5$, $m=\frac{b-n}{n^2}^{\frac{1}{4}}=10$. Therefore, $x=100$, $y=25$, and the *Tower's Height* $=96.8245$ Feet, *fers.* W. W. R.

Mr. *Stephen Hartley*, of *Sorverby-Bridge*, answered it truly by another Substitution.

Mr. *Gemini*, of *Morpeth*, solved it like Mr. *Dalton*. Mr. *George Hicks*, of *Reedness Free-School*, solved the Equations by the Method of *Trial and Error*, or *Double Rule of False*; making the *Tower's Height* $=96.824$, &c. Feet.

Mr. *William Wells*, and Mr. *Thomas Burbill* his Scholar, of 14 Years, both answered it, according to the Rule of *Double Position*, or *Trial and Error*; the Scholar's Method wrought out. Mr. *John Buddle*, of *Kyo*, in the County of *Durham*, determined the *Tower's Height*, as above, by a short and elegant Process; as did Mr. *William Turner*, Teacher of Mathematics, in *Witney, Oxfordshire*, and Mr. *Thomas Adcock*, of *Asby de la Zouch*. Mr. *Alexander Rowe*, after a correct Substitution, solves the final Equation by *Trial and Error*, making $x=100$, and the *Tower's Height* $=96.8245836$ Feet: And Mr. *Robinson*, of *Biddick*, solved it by a short Process, making the *Tower's Height* $=96.825$ Feet. Also Mr. *Samuel Bonner*, of *Leicester*, truly solved it.

Mr. *R. Judson*, Teacher of Mathematics and Writing-Master at *Beverly School, Yorkshire*, says, that it is easily seen that x and y must be *square Numbers*; and from the 2d Equation it is evident, that $x=100$ and $y=25$; whence the *Tower's Height* follows, by 47. e. 1. Mr. *William Pen*, of *Chalfont*; Mr. *Jonathan France*, of *Hope, Derbyshire*; Mr. *Thomas Atkinson*, of *Ingham*; and Mr. *Draper*, solved it.

Mr. *George Coughron*, of *Wreighbill, Northumberland*, judiciously observes, from the Equations given, that x and y must be *whole square Numbers*; who

therefore determines, from 1st, $\sqrt{x-xy^2}=62510=2501^2$; that $x=100$, and $y=25$; whence the *Tower's Height* follows, as by Mr. *Judson* determined.

III. QUESTION 403, answered by the Palladium-Author.

THE several *Principals* first put out, at 4, 5, and 6, per Cent. per Annum, simple Interest, (to produce the Amounts of 520, 1000, and 1600 *l.* at the End of 1, 5, and 10 Years respectively), will be 500, 800, and 1000 *l.* which let $=a$, b , and c . And put A $=$ the Sum of *Amounts* they must produce at the

the End of t Time = 3120 $l.$ Then, by the Rules of *Simple Interest*, and *per Quest.* R = the common Rate of *Simple Interest* of 1 $l.$ per Annum for 2300 $l.$ (the Sum of the Principal let out) = P . Then, at $x \cdot .04 + bt \cdot .05 + ct \cdot .06$

$$+P = R \times tP + P = A. \text{ Whence, } t = \frac{A-P}{.04a + .05b + .06c} = \frac{820}{120} =$$

$$6 \frac{5}{6} \text{ Years. Whence } R = \frac{A-P}{tP} = \frac{820}{6 \frac{5}{6} \times 2300} = .0521739, \text{ \&c.} =$$

5 $l.$ 4 $s.$ 4 $d.$ 0 $gr.$.69, \&c. per Cent. required.

Gemini, of Morpeth, answers this QUESTION as follows, very concisely.

$$\frac{520}{1 + .04 \times 1} = 500; \quad \frac{1000}{1 + .05 \times 5} = 800; \quad \text{and} \quad \frac{1600}{1 + .06 \times 10} = 1000 \text{ } l.$$

Then, $500 + 800 + 1000$, the *respective* Principals lent out (at 4, 5, and 6 per Cent. per Annum, *simple Interest*) = 2300 $l.$ the Sum of those Principals. Hence, 3120 (the Sum of their Amounts in 1, 5, and 10 Years) — 2300 = 820 $l.$ the *Interest* to be raised, at *simple Interest*, from 2300 $l.$ lent.

$$\text{But } \left. \begin{array}{l} \text{£.} \\ 20 \\ 40 \\ 60 \end{array} \right\} = \text{Int. of } \left\{ \begin{array}{l} \text{£.} \\ 500 \\ 800 \\ 1000 \end{array} \right\} \text{ for 1 Year at } \left\{ \begin{array}{l} \text{£.} \\ 4 \\ 5 \\ 6 \end{array} \right\} \text{ per Cent.}$$

Say, as Sum 120 : 1 Year :: 820 $l.$: $6 \frac{5}{6}$ Years.

$$\text{Also } \frac{820}{6 \frac{5}{6} \times 2300} = .05217, \text{ \&c. } 5 \text{ } l. \text{ } 4 \text{ } s. \text{ } 4 \text{ } d. \text{ per Cent. the common}$$

Rate of *simple Interest*, required.

N. B. Most of our Correspondents gave *erroneous* Solutions to the above Question, (though plain and easy to be understood) from a Misconception of its Meaning. And some, comprehending its Meaning, wrought out the Numbers by an *erroneous Process*. And some conceived Nothing of the Matter; calling it a *mystical Question*, though very capable of solving more difficult Questions. Some make the Rate *per Cent.* of any Value; and some above 5 Times as much as it is proved to be in the above Solutions.

Mr. Robinson, of Biddick, gave a true Method.

Mr. George Coughron, of Wreighbill, Northumberland, gave the required Rate *per Cent.* from a short and exact Method, 5 $l.$ 4 $s.$ 4 $d.$.178.

IV. QUESTION 404, answered by Mr. William Turner, Teacher of Mathematics at Whitney, Oxfordshire.

PUT x for the Number of Men in the Side of the Square: Then, *per Quest.* $x^2 + 71 = 2x - 70 = 276$. Whence, $x = 173$, and $x^2 + 71 = 30000$ Men the General had in the Field.

Mr. Stephen Hartly, of Sowerby-Bridge, answered it much in the same Manner. He puts x = Side of one Square, then $x + 1$ = Side of the other; and, by *Quest.* $x^2 + 71 = x^2 + 2x + 1 - 276$; whence $x = 173$; and therefore 30000 Men were in the Field, W. W. R.

Mr. Thomas Adcock, of Asby de la Zouch, answered it truly in the same Manner; as did Mr. William Wells, of Crowle Free-School, Lincolnshire. Also Gemini, of Morpeth; Mr. Richard Dalton, of Pool; Mr. Thomas Stuckfield, of Stepney; Mr. Robert Le Merchant, Pupil at Mr. Adams's Academy, Waltham-Abbey; Mr. George Hicks, of Reednefs Free-School, Yorkshire; Mr. Robinson,

Robinson, of Biddick; Mr. R. Judson, of Beverly School; Mr. Alexander Rowe; Mr. Eadon Campey, at Crone, York; Mr. Samuel Bonner, of Leicester; and Mr. Draper.

Mr. George Newland, of Mr. Nicholson's mathematical School in the Isle of Wight, answered it shortly, and similar to Mr. Turner's Answer above.

Mr. George Coughron, of Wreighbill, Northumberland, likewise answered it very concisely.

V. QUESTION 405, answered by Mr. Alexander Rowe, of Reginnis, Cornwall.

BY Table III. P. 256. of a Book intituled *Select Exercises*, the present Value of 1 l. to be received at the End of 17 Years, according to 3, 4, and 5 per Cent. per Annum, Compound Interest, will be = .6050; .5134; and .4363; respectively. Whence, $.6050 \times 1200 (= 40 \times 30) = 726$ l. $.5134 \times 1200 = \text{£} 616.08 = 616$ l. 11s. 7d. $\frac{1}{4}$; and $.4363 \times 1200 = \text{£} 523.56 = 523$ l. 11s. 2d. $\frac{1}{2}$, fere, the Value of the Reversion, or Worth of the Estate in present Money, according to the several Rates of Interest allowed to the Purchaser, W. W. R.

Mr. Robinson's Answer, of Biddick:

$40 \times 30 = 1200$ l. the Estate sold for; $\frac{1200 + 40}{1200} = 1.03333$, the Amount of 1 l. for 1 Year, which is 3 l. 6s. 8d. per Cent. Put $u = 40$ l. the yearly Rent, $r = 1.0333$ $\therefore \frac{u}{r-1} = 1200$ l. = A. Put $t = 17$ Years: Then,

$$\frac{A}{r^t} = P = \frac{L. 1200 \times L. 30}{L. 31}^{17} = 687$$
 l. 4s. the present Worth of the Estate for ever.

Mr. Judson, of Beverly, by another Process, makes the Value of the Fee or Perpetuity of the Estate = 1754.38 (from $r = 1.0228$ he deduced), whence

$\frac{40}{.022} =$ as before. Then he says the Value of the Reversion, after 17 Years,

is 30 Years Purchase, or 1200 l. Th. $1754.38 - 1200 = \text{£} 554.38$; that is, 13.86 Years Purchase, nearly. W. W. R.

N. B. As no two Correspondents agree in their Results, we shall leave the Answer to be reconsidered, as we apprehend the true Meaning of the Question is misconceived.

Mr. Thomas Atkinson, of Ingham, Lincolnshire, says, First, $40 \times 30 = 1200$, the present Worth of the Estate to be entered on immediately. Put $a = 1200$, $u = 40$, $R = 1.04$, $t = 17$ Years. Then, by P. 266 of Ward's Young Mathematician's Guide, we have $\frac{uk^t - u}{R-1} = 293$ l. 11s. 6d. the Worth of the

Estate, in present Payment, to be entered on 17 Years hence.

Mr. George Coughron, of Wreighbill, Northumberland, (whose Judgement and Truth we esteem), answered this Question thus. Find the present Value of 1200 l. (the Money the Estate is sold for) due 17 Years hence. Let $1200 = a$, $17 = t$, r = the Amount of 1 l. in 1 Year at any Rate of Interest, and P the required present Value. Then, by the Theorems of computed Interest, Log. $P = \text{Log. } a - t \times \text{Log. } r$; th. when r is given, P will be known; and will, when $r = 1.033$, &c. (the Rate of Interest allowed to the Buyer per

Quest.) be found $687.25 \text{ l.} = 687 \text{ l. } 5 \text{ s.}$ very nearly agreeing with Mr. Robinson.

VI. QUESTION 406, answered by Mr. John Buddle, of Kyo, Durham.

LET $v =$ Velocity at the End of the Fall, $f = 16 \frac{1}{12}$ Feet, and $d = 2100$

Feet; then, by the *Laws* of descending Bodies, $v = 2\sqrt{fd} = 367.56, \&c.$

Feet. And the *Momentum* respecting Weight $= \frac{367.56, \&c.}{16} = 23 \text{ lb. A-}$

voirdupoize, nearly. W. W. R.

N. B. Sixteen Ounces $= 1 \text{ lb. Avoirdupoize.}$

Mr. George Hicks, of *Reedness* Free-School, *Yorkshire*, answered it in like Manner.

Mr. William Wells, of *Crowle* Free-School, *Lincolnshire*, puts $b = 2100$ Feet, $c = 16 \frac{1}{12}$ Feet, the Descent of falling Bodies in the 1st Second of

Time; then, by a known Theorem, $\frac{2b}{\sqrt{\frac{b}{c}}} = 2\sqrt{bc} = 367.77, \&c. \text{ Feet,}$

the Ball's Velocity at its Return to the Earth's Surface; which being multiplied by its Weight, viz. 1 Ounce $= 367.77, \&c. \text{ Ounces} = 22 \text{ lb. } 15.77 \text{ oz.}$ W. W. R.

Mr. Judson, of *Beverly*, answered it in the same Manner; as did Mr. Alexander Rowe, of *Cornwall*.

VII. QUESTION 407, answered by Mr. William Wells, of *Crowle* Free-School.

PUT $5x =$ the Son's Share and $4y =$ the Daughter's Share: Then will $5x + 4y = 1000 \text{ l.} = a$; and $x - 10 = y$ by *Quest.* Consequently, $4x - 40 =$

$4y$, $\therefore 4x - 40 = a - 5x$, by 1st Equation. Hence, $x = \frac{a + 40}{9} = 115 \frac{5}{9}$.

$y = 105 \frac{5}{9}$. And the Son's Share $= 577 \frac{7}{9}$

Daughter's $= 422 \frac{2}{9}$

Proof 1000 l.

Mr. William Maifden, of *Netherhurst*, *Derbyshire*, answered the same.

Mr. Robert le Merchant, Pupil at Mr. Adams's Academy, *Waltham-Abbey*; Mr. George Hicks, Teacher of *Reedness* School, *Yorkshire*; Mr. Joseph Sberwin, of *Alvaston*; Mr. Stephen Hartley, of *Sowerby-Bridge*; Mr. John Buddle, of *Kyo, Durham*; Mr. Thomas Stuckfield, of *Stepney*; Mr. William Turner, Teacher of Mathematics, at *Whitney*, *Oxfordshire*; Gemini, of *Morpeth*; Mr. Thomas Adcock, of *Ashby de la Zouch*; Mr. Richard Dalton, of *Pool*; Mr. Eadon Campey, of *Crane, York*; Mr. William Pen, of *Chalfont*; Mr. Samuel Bonner, of *Leicester*; Mr. Alexander Rowe, *Cornwall*; Mr. R. Judson; Mr. W. Roberts, of *Greasbrough*, near *Rotherham*; Mr. Robinson, of *Biddick*;

Mr. Jonathan France, of Hope, late of Wormbill, Derbyshire; and Mr. Atkinson, of Ingham; likewise solved it.

Mr. George Newland, of Mr. Nicholson's School in the Isle of Wight, answered it similar to Mr. Wells's Solution above.

Mr. George Coughron also easily answered it.

VIII. QUESTION 408, answered by Mr. George Hicks, of Reednefs School.

IT is easily discovered that the Field is a right-angled Triangle; and then both the acute Angles are given, viz. $36^{\circ} 52'$ and $53^{\circ} 8'$. Which being supposed, the three Sides are easily determined to be 6, 8, and 10; the Sum

of whose Cubes = 1728 Chains. Its Area = $\frac{6 \times 8}{2} = 24$ Chains, required.

For $.6 = a = S. 36^{\circ} 52' = \angle ACB$.

$.8 = b = S. 53^{\circ} 8' = \angle BAC$.

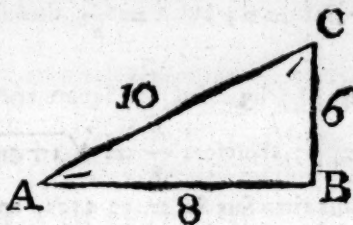
Put $2x = AB$.

Then, by Trigonometry, as $b : 2x :: a :$

$\frac{2ax}{b} = BC$; therefore $\frac{2ax^2}{b} = 24$ Chains,

by Quest. and $x = \sqrt{\frac{24b}{2a}}$. Whence $x =$

4, and $AB = 8$, $BC = 6$, and $AC = 10$ Chains.



Remark. One of our Correspondents supposed a right Angle at the Vertex of the Triangle, and also supposed the Area = 6 (instead of 24) Chains, putting x and y for the Legs, and z for the Hypotenuse at the Base; determining the Legs and Hypotenuse to be 3, 4, and 5, answering to the supposed Area = 6 Chains. But then the Sum of these Sides cubed will be = 216 instead of 1728, the other Conditions, after he had arbitrarily altered the Area from 24 to 6 Chains.

His palpable *Mistake*, in the Solution this Way, arose from making the Sum of the 3 Sides, $x + y + z = 6$, his supposed Area; because 6 happened to be Half the Cube Root of 1728; which has no Relation to the stated Conditions of the Sum of the 3 Sides cubed = that Number. — We insert this Remark as a future Caution for Correspondents to be careful of observing the Conditions proposed in a Question.

Mr. Stephen Hartley, of Sowerby-Bridge, by an exact Process and final Equation, has determined the 3 Sides of the Triangle as above; making it a right-angled Δ . — But the Nat. Sine and Cos. of $\angle 36^{\circ} 52'$ and $53^{\circ} 8'$ being .6 and .8, nearly, soon discovers the Triangle, when tried. Mr. Samuel Bonner, of Leicester, gave the same Answer: As did Mr. R. Judson, of Beverly; Mr. William Pen, of Chalfont; Mr. Alexander Rowe, who supposes the Area unnecessary, which depends on the Triangle's being right, otherwise 3 independent Data are necessary. Mr. Jonathan France also solved it.

Mr. George Coughron solved the same by a general Method, and reasoned well on the Question's Properties.

Mr. W. Wells, of Crowle, Lincolnshire, answered this Question in the foregoing Numbers, making it a right-angled Triangle.

IX. QUESTION 409, answered by Mr. Stephen Hartly.

LET OPBQQ be the given Sector; Sm the Transverse; nB the Conjugate Axis; and Sn = $\frac{1}{2}$ of the Curve of the Ellipsis. Draw the Radius Om, and put s and q the Sine and Cos.

of $\frac{Bom + OQm}{2}$, x and y those of Half their

Dif. Rad. = 1 and Om = 20. By Trig. $y + aqx = Um$; and $aqy - asx = Um$. And by

Quest. 7854 $\times asy + aqx \times aqy - asx \times 2$ must be a Maximum. In Fluxions, $4sqyy + xy$

$+ y\dot{x} = 0$; but $\dot{x} = \frac{y\dot{y}}{x}$, therefore $4sqyy + xy - \frac{y^2\dot{y}}{x} = 0$; and $x^2 - 4sqxy$

$= y^2$; by comp. the Square and extracting the Root, $x = y \sqrt{1 + 4s^2q^2} -$

$2ysq$; therefore $\frac{x}{y} = \sqrt{1 + 4s^2q^2} - 2sq = .44328 = \text{Tan. } 23^\circ 54' 14''$;

and therefore Sm = 33.3192, and Bn = 17.8684. W. W. R.

Mr. Robinson, of Biddick, answered it by another Method.

Mr. George Coughron, of Wreighbill, answered this Question in a masterly Manner by a general analytical Process; but brought out no Numbers.

N. B. He sent us a Book of elegant Solutions (by Process and Numbers) to most of the Questions.

X. QUESTION 410, answered by the Palladium-Author.

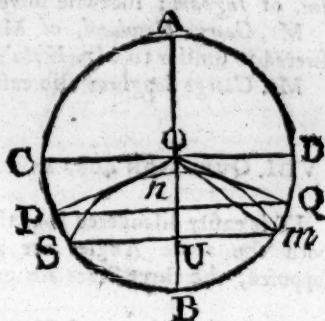
PUT a, b, c , (=5, 8, 10) for the Miles travelled per Day by each Traveller, A, B, C, respectively; m = the Circumference of the Island in Miles = 73.

Then, as $a : 1^d$ } $\left\{ \begin{array}{l} \frac{m}{a} = \text{A's} \\ \frac{m}{b} = \text{B's} \\ \frac{m}{c} = \text{C's} \end{array} \right\}$ Number of Days in travelling once round the Island.

To determine the Time when any Number of Travellers, or Bodies, above two, will next meet, (setting out from the same Place together, and uniformly moving the same Way, in the same Circumference) from the Time of each Revolution being given.

RULE I. Find the least Dividend, that each of the given Times of Revolution of above two Bodies will divide, without any Remainder, it will be the true Answer, (see Pal. 1767. p. 43.) in least whole Numbers.

RULE II. Reduce the Time of each Revolution to a Fraction of the same Numerator (a whole or broken Number) in the lowest Terms, so that the several Denominators may be the least whole Numbers, and the said same Numerator correspondent will be the true Answer; and the said several Denominators, in lowest Terms, will be the respective Number of Revolutions of each Traveller, or revolving Body, when they all first meet; which will be at the Place of their first setting



ting out; and not a Place where any two of the moving Bodies first meet, where but Parts of Revolutions are performed by each, and not complete Revolutions.

RULE III. The first Meeting of any two Bodies will be the Quotient of the Product of their respective Times of Revolution, divided by their Difference; as proved in a former Palladium.

Let x = least Dividend, or Number of Days, that A, B, and C's Time, or Days, of Revolution will divide. From above, say,

$\begin{array}{l} \text{d Rev. d} \quad \text{Revol.} \\ \text{As } \frac{m}{a} : 1 :: x : a \times \frac{x}{m} \\ \frac{m}{b} : 1 :: x : b \times \frac{x}{m} \\ \frac{m}{c} : 1 :: x : c \times \frac{x}{m} \end{array}$	} travelled by	$\left\{ \begin{array}{c} A \\ B \\ C \end{array} \right\}$	in x Days; when A, B, and C, first meet, at the Place of first setting out together.
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Now, that A, B, and C's, may be complete or whole Revolutions, (as it is evident they must be when they meet), in the present Case x will ($= m$) = 73 Days, for the least Number of Days when A, B, and C, first meet. And a , b , and c , in lowest Terms, ($= 5, 8, 10$.) their respective Number of Revolutions then performed.

And 73 multiplied by 1, 2, 3, 4, &c. will be the successive Times of Revolutions; and 5, 8, 10, multiplied by 1, 2, 3, 4, &c. respectively, will be A, B, and C's successive Number of Revolutions.

N. B. 5329 divided by 73 quotes 73 Times A, B, C had met, instead of Mr. Birk's once in 5329 Days.

Divide the Miles or equal Parts in the Circumference by the greatest common Measure of the respective Miles travelled per Day, or equal Part of Time, by each Traveller, (when above two in Number) for the least Time of their meeting in broken Numbers; and divide their respective Miles, per Day, by their greatest common Measure, for their least Number of Revolutions performed at their first meeting together.

Thus, if the Island, instead of 73, had been 160 Miles in Circumference, (divisible by 5, 8, and 10) then 32, 20, and 16 Days, respectively, had been the Times of A, B, and C making one Revolution each about the same. And, by RULE I. for finding their least Dividend, 160 Days had been the least Number of Days in which they could first meet, equal to the Circumference; and therefore the Number of Revolutions, 5, 8, and 10, as before.

If the Island had been 40 Miles round, then 8, 5, 4 Days had been the respective Times of one Revolution of A, B, and C, the least Dividend to which $= 40$, the least Number of Days of Meeting equal to the Number of Miles Circumference; and the Revolutions 5, 8, and 10.

If the 3 Travellers travelled 16, 20, and 24 Miles per Day, then the Quotient of 73 Miles, divided by their greatest common Measure 4, will be $18\frac{1}{4}$ Days, in a fractional Number, for their least Time of Meeting, and their respective Number of Revolutions, 4, 5, and 6, the Quotients of the Miles of each Traveller per Day, (viz. 16, 20, and 24), divided by the same greatest common Measure.

By RULE II. 8, 5, and 4 Days of each Revolution $= \frac{8}{1}, \frac{5}{1}, \frac{4}{1}$, reduces

to $\frac{40}{5}, \frac{40}{8}, \frac{40}{10}$, of one common Numerator; where 40 = least Days, and the De-

ominators, 5, 8, and 10, = the respective Revolutions, and cannot be reduced lower; therefore are the *least* Time of Meeting and Number of Revolutions.

But $\frac{73}{16}, \frac{73}{20}, \frac{73}{24}$, the Times of A, B, and C's performing one Revolution respectively, have one Numerator. And dividing that Numerator in common, viz. 73, by 4, the greatest common Measure, of 16, 20, and 24, (the Miles travelled by A, B, C, per Day), the Quotient = $18\frac{1}{4}$ Days, the *least* Time of Meeting (in broken Numbers) with 4, 5, and 6, complete Revolutions performed by A, B, and C; dividing the several Denominators by the greatest common Measure.

If H, M, and S, the Hour, Minute, and Second, Hands of a Watch, perform their respective Revolutions in 12^h , 1^h , and $\frac{1}{60}$ of an Hour, or in 720,

60, and 1, Minutes respectively, = $\frac{720}{1}, \frac{60}{1}, \frac{1}{1}$, they reduce to one Nume-

rator, $\frac{720}{1}, \frac{720}{12}, \frac{720}{720}$, in lowest Terms; where 720 = least Number of

Minutes of their first Meeting, after setting out together; and 1, 12, and 720, the respective Revolutions performed by H, M, and S.

RULE I. For finding the *least Dividend* to 720, 60, and 1, gives the same Answer.

So the Answer to the Prize-Question in Pal. 1765 (given at P. 37, 38, Pal. 1766) is found from the Periods of Revolution, 7^d ; $29^d 12^h 44^m 1^s 45^{th}$;

$365^d 5^h 49^m$ (by RULE II.) reducing to $7^d, 29^d \frac{183367}{345600}, 365^d \frac{349}{1440}$; or

$\frac{7^d}{1}, \frac{10205767}{345600}, \frac{525949}{1440}$; to be reduced to one Numerator, in lowest or least

Terms, = $7 \times 10205767 \times 525249 = 7 \times 525949 \times 11 \times 927797$ (same as at Pal. 1766) the common Numerator, whose several Denominators, in lowest Terms, are the respective Revolutions performed.

N. B. The foregoing Rules will answer all Questions of this Kind, for any Number of revolving Bodies, about a Center, above two, which must next meet at the Place of their first setting out; each performing a complete Number of Revolutions. But they will not answer for two revolving Bodies, where the slower Body performs but Part of a Revolution, whilst the swifter performs one complete Revolution and Part of another, as in the Hour and Minute Hands of a Watch. The Rule for which first Time of any two Bodies Meeting being, universally, the Product of the Time of performing each Revolution divided by their Difference, as in a former Palladium is proved.

Hence the Method of Solution by two and two revolving Bodies combined, where each swifter Body meets with the slower, or one Body with the other, as B and C first meet with A, includes not the Idea of Solution, and led Mr. Birk into the Mistake. For the first Meeting of the 3 Travellers, or revolving Bodies, must be (after a Number of whole Revolutions) at the Place of their first setting out; which cannot meet all together at any of the Places where any two next meet together, till after making a greater Number of Revolutions than are made to meet at the Place of first setting out.

*** Left

* * Left Numbers can be so proposed for 3 or more Travellers, or Bodies, setting out together, to meet in Parts of, instead of whole, Revolutions, we leave the following general Method of Solution to be considered.

Answer by Mr. George Coughron, of Wreighill, Northumberland.

A general Investigation. Let the Number of Persons be what they will.—Put a, b, c , &c. for the Number of Miles travelled in a Day by A, B, C, &c. respectively, (supposing A the slowest Traveller), m for the Circumference of the Island in Miles; and t for the Time elapsed between their setting out and their first coming together again; then will the first Time of A and B's coming to-

gether be $\frac{m}{b-a}$, Days of A and C's $\frac{m}{c-a}$, of A and D's $\frac{m}{d-a}$, &c. Now,

as it is evident, that t (or the least Time in which they will all come together) must be a Multiple of each of these Times, it follows that t must be the least whole Number that can be divided by each of these Expressions, separately, to

leave no Remainder, that is, $t \times \frac{b-a}{m}$, $t \times \frac{c-a}{m}$, $t \times \frac{d-a}{m}$, &c. must be

all whole Nos; which will always be the Case, when t = the least common De-

nominator of $\frac{b-a}{m}$, $\frac{c-a}{m}$, &c. when put into Numbers and properly reduced;

and therefore t may be easily determined, whether m, a, b, c , &c. be whole Numbers or Fractions. For if they be all whole Numbers, and any one of the

Fractions, $\frac{b-a}{m}$, $\frac{c-a}{m}$, &c. as they stand, in their lowest Terms, then will

$t = m$; but if they have all some, and the same, common Measure, then it will be $= m$ divided by their greatest common Measure. And if they are Fra-

tions, the Procefs will not be much more difficult; for when $\frac{b-a}{m}$, $\frac{c-a}{m}$, are

put into Numbers and reduced to Fractions, whereof the Numerators and Denominators are whole Numbers, then may their least Denominator ($= t$) be easily determined.

In the present Case, $\frac{b-a}{m}$ and $\frac{c-a}{m} = \frac{3}{73}$ and $\frac{5}{73}$; which being in their

least Terms, shews that $t = 73$ Days, and not 5329, according to Birk's Arithmetic; for that being $= 73 \times 73$, will be their 73d Time of Meeting, as they will meet at every Multiple of 73. W. W. R.

Mr. Samuel Bonner, of Leicester, answered the same; also Mr. R. Judson, of Beverly; Mr. Robinson, of Biddick; Mr. W. Pen, of Chalfont; Mr. W. Roberts, of Greatbrough, near Rotherham; Mr. Richard Dalton, of Pool; Mr. William Turner, of Whitney, Oxfordshire; and Mr. Alexander Rowe.

XI. QUESTION 411, answered by Mr. Judson, of Beverly.

SINCE Action and Reaction are equal, the Motions of the Ball forward, and Cannon recoiling backward, will be inversely as their Weights; that is, as 24 lb. : 640 Feet :: 6400 lb. : 2.4 Feet, per Second. W. W. R.

Mr. William Turner, of Whitney, answered it in the same Numbers; as did Mr. William Wells, on the same Principles, (the Momentums of the Cannon and Ball being equal), putting $W = 6400$, $w = 24$, $V = 640$, $v =$ Velocity with

with which the Cannon recoils, $Wv = wV$; whence $v = \frac{wV}{W} = \frac{24 \times 640}{6400}$

$= 2 \frac{2}{5}$ Feet, as before.

Mr. Stephen Hartley answered it. And Mr. W. Roberts, of Greasbrough, near Rotherham, refers the Reader to *Fletcher's Universal Measurer and Mechanics*, p. 233, *Quest.* 220; where (he says) this Question may be seen *verbatim*, with the *Solution*. — Mr. George Hicks, of Reedneſs Free-School ſolved it; alſo Mr. Alexander Rowe.

Mr. George Coughron answered this Question like Mr. Judſon above.

XII. QUESTION 412, answered by Mr. Stephen Hartley, of Sowerby-Bridge.

LET $ZP =$ Comp. Lat. ſought, $BP = AP =$ Comp. Sun's Decl. $ZA =$ Comp. leſſer Altitude, and $ZB =$ that of the greater. Draw the Arc of a great Circle AB ; then, in the Triangle BPA , there is given $PB = PA$, and Angle BPA , to find AB , and the Angles at A and B , alike.

Next, in the Triangle ZBA , the 3 Sides are given, to find the Angle at B , from which taking the Angle PBA leaves the Angle PBZ .

Laſtly, in the Triangle PBZ , there is given PB , BZ , and PBZ , to find $ZP = 61^{\circ} 33' =$ Comp. Lat. required, whence the Lat. $28^{\circ} 27'$. — Hence, by *Mercator's Sailing*, the *Course* will be $62^{\circ} 44'$ South Weſterly, and the *Diſtance* 2399.5 Miles. W. W. R.

N. B. Mr. Hartley ſhould not have conſidered the Sun's Declination at Noon, the ſame as when the Ship lay to; for ZP is not $= BP$.

Mr. George Coughron, of Wreighbill, Northumberland, remarks thus. The Sun's Declin. at the Times of Observation, would be about 14° N. and, as true Altitudes and their intermediate Times of Observation are given, I find the Comp. Latitude of the Place in which the Ship lay-to (as I find that in *Quest.* XV.) to be $61^{\circ} 19'$ N. whence the Latitude, where the Ship lay to, $28^{\circ} 41'$.

Now the Ship's Latitude is found, her Longitude, and alſo *Course* and *Diſtance* to Barbadoes, may be found, by *Mercator's Sailing*, from the Latitude and Longitude of Madeira and of Barbadoes.

☞ Theſe Differences ariſe from the Propoſers not ſending us their Solutions, to compare with other Solutions; as we have not Time, (nor will we take the Trouble) to examine and go through all the Steps of every Solution.

XIII. QUESTION 413, answered by Mr. Robinson, of Biddick:

$$\frac{24^h}{4+1} = 4^h 48^m, \text{ Length of the Night.}$$

$19^h 12^m$, Length of the Day. Sun riſes at 24^m paſt 2 o'Clock; Sun's Aſc. Diff. $= 54^{\circ}$; now, as the Sun's Declination is not given, admit it to be $23^{\circ} 30'$ on the longeſt Day.

Therefore $\frac{\text{Rad.} \times \text{S. Sun's Aſc. Dif. } 54^{\circ}}{\text{Tang. Sun's Decl. } 23^{\circ} 30'} = \text{Tan. } 61^{\circ} 45'$, the Latitude of the Place, required.

The same answered by Mr. Alexander Rowe.

THE Sum of the Length of the Day and Night being = 24 Hours, *theref.*
As $5 : 24 :: 4 : 19^h.2 = 19^h.12^m = \text{Day's Length}$; and $4^h.48^m = \text{Night's Length}$. Hence, $3^h.36^m = \text{Asc. Dif.} = 54^\circ$. Put $t = \text{Tangent}$
 $23^\circ 29'$, and $s = \text{Sine Asc. Difference}$. By Spherics, As $t : 1 (\text{Radius})$

$:: s : \frac{s}{t} = 1.0620929 = \text{Tan. } 61^\circ 45' 46''$, the Latitude required.

Mr. Judson, of Beverly, makes the required Latitude = $61^\circ 46' 20'' 27''$, agreeing with Mr. George Coughron, by a similar Process to the former.

Mr. Richard Dalton, of Pool, by a short Process, finds the Latitude $61^\circ 51'$; so that the Night, happening about the 20th of March, may be to the Length of Day as 1 to 4.

Mr. George Coughron, of Wreighhill, Northumberland, answers it thus.

THE Latitude is $61^\circ 46' \frac{1}{3}$, (by a Method like Mr. Robinson's). Who remarks, that in any Place from the Latitude $61^\circ 46' \frac{1}{3}$ to the Pole, at a particular Time of the Year the Night to Day will be as 1 to 4; and therefore the Question, as proposed, is indeterminable or unlimited. For, either the Latitude or Time must be given before the other can be found.

Another able Correspondent remarks the same.

XIV. QUESTION 414, answered by Mr. R. Judson.

BY Mr. Hodgson's Fluxions, P. 37, the Momentum at the greater End of the Beam will be Half the Distance from the Fulcrum multiplied into Half the Weight, or Weight at the Middle, *viz.* $10 \times 5 = 50$; and the Momentums, at the lesser End, will be (putting $x = \text{Weight sought}$) = $\frac{1}{2}x + \frac{1}{2}$; therefore $x = 99$ oz. the Weight required to poise the Beam in Equilibrio. W. W. R.

By the Palladium-Author.

ACCORDING to Mr. Emerson's Mechanics, Exam. 7. and Construction. Let $x = \text{Weight}$, hung Half an Inch from the Fulcrum; Distance of the Fulcrum from the longest End of the Beam = 10 Inches: Then, the Weight of 1 Inch, from the Fulcrum to the shorter End of the Beam, $+ x$, the Weight multiplied by the Distance of the Fulcrum from the Point, when the *ce* Weight is suspended, will be equal to the Distance of the Fulcrum from the longer End

multiplied into the Distance from the Center of Gravity. That is, $\frac{1}{2} \times 1 + x = 10 \times 5 = 50$: Whence, $1 + x = 100$, and $x = 99$ Ounces, as before.

Mr. George Coughron, of Wreighhill, Northumberland, solved it in like Manner.

XV. QUESTION 415, answered by Mr. Stephen Hartly, of Sowerby-Bridge.

PUT $a = \text{Cof. BZ} = 20^\circ 24'$, the greater Altitude's Comp. $b = \text{that of AZ}$ (see the Fig. in Answer to Quest. XII.) $m = \text{that of BPZ} = 15^\circ 50' \frac{1}{2}$, and $n = \text{that of APZ} = 38^\circ 54' \frac{3}{4}$. s and $q = \text{Sine and Cof. of the Sun's Declination} = 19^\circ 34'$, x and $y = \text{those of the required Latitude, Rad.} = 1$. By a known Theorem, $sy + ngx = a$, and $sy + mx = b$, their Difference = $-ngx$

$+mx = a - b$. Therefore, $x = \frac{a - b}{q \times m - n} = .63168 = 50^\circ 49' \frac{1}{2}$, by an easy Process.

N. B. This Question may be solved like the former Part of the XIIth, to find the Latitude from the Interval of two Observations; without any Regard to the Times of the 1st and 2d Observations, wherein Mr. Maskelyne, the pre-

sent *Astronomer Royal*, has given superfluous *Data*, and perplexed the Solution with Inconsistencies. Who, by an *unscientific Process*, (wherein he assumes Part for granted of what was required, viz. Lat. $48^{\circ} 30'$), determines the Latitude, by a prolix *Calculus*, to be $48^{\circ} 45'$. Then finds Dist. of greatest Alt. from Noon $14^{\circ} 35'$ — — — — — In Time = $3^h 58^m 20^s$

Whence the Time in the Forenoon = 11 1 40
Time by Mr. Maskelyne's Watch 10 56 38

His Watch too fast 5 2

Who has not proved the Time of the first Observation correspondent to $9^h 24^m 21^s$ by his Watch, for proving the Operation or Difference between both the Observations this Way computed; (as given also, P. 76. *Mariner's Guide*, $1^h 32^m 17^s$, requiring an improved Edition.)

Mr. Thomas Robinson, of Biddick, by a like Method with the former by Mr. Stephen Hartley,

PUTS s and $c = S.$ and $Cof.$ of Sun's Decl. Rad. = 1. } x and $y = S.$
 $b = S. 13^{\circ} 50' =$ Sun's Alt. at 1st Observation. } and $Cof.$ Lat.
 $p = S. 20 24 =$ his Altitude at the second Ditto.
 $u = Cof. 74 10 =$ Ang. to Noon at second Observation.
 $k = Cof. 51 6 =$ Ang. to Noon at first Observation.

By *Palladium* 1770, P. 66, Equation 1.

$$\begin{aligned}cky + sx &= k \\cuy + sx &= p\end{aligned}$$

Dif. $cuy - cky = p - b$, and $y = \frac{p - b}{c \times u - k} = .64933, 45^{\circ} 30'$ *Cof.* Latitude,

whence Lat. = $49^{\circ} 30'$, required.

Hence, by Comparison of Mr. Robinson's with Mr. Hartley's Solution, one, if not both, have been mistaken in the Operation.

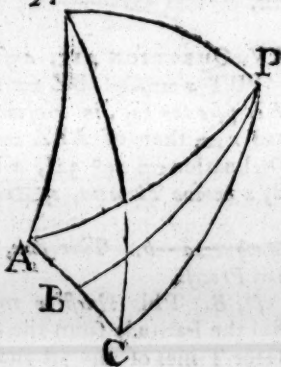
Mr. Alexander Rowe says, As $1^h 32^m 17^s$ (Dif. of Observation) : $6^{\circ} 34'$ (Dif. of Altitudes) :: $1^h 3^m 22^s$ (Dif. last Observation from Noon) : $4^{\circ} 30' 32'' + 20^{\circ} 24'$ (Sun's Alt. 1st Observation) = $24^{\circ} 54' 32''$; take which from 90° , rem. $65^{\circ} 5' 28'' - 19^{\circ} 34'$ (Sun's Decl. S.) = $45^{\circ} 31' 28'' + 3^{\circ} 17'$ (Half Dif. Altitudes) = $48^{\circ} 48' 28''$, Latitude required.

N. B. Had the Sines of the Arcs been used in the foregoing Proportion, the Latitude had been more correct.

This practical Solution however nearly agrees with the following correct one; and is far nearer Truth than from the Method (given by Mr. Maskelyne) in the *Nautical Ephemeris*, which the Navy should reject as fallacious.

Accurate Solution by Mr. Coughron, of Wreighthall, Northumberland.

LET P represent the North Pole, Z the Zenith of the Place, whose Latitude is required. A and C the Places of the Sun at the Times of Observation; AC an Arc of a great Circle passing through A and C; and PB an Arc of another great Circle perpendicular thereto, which will evidently bisect it; and PA may be supposed = PC. Then, in the right-angled spherical $\triangle PBC$, are given, the Hypotenuse PC (the Sun's Distance from the Pole) = $109^{\circ} 34'$, and the $\angle BPC$ (Half the intermediate Time of Observation) = $11^{\circ} 32' \frac{1}{2}$, to find BC (= AC) = $100^{\circ} 51' 38'' \frac{1}{2}$, and $\angle BCP = 93^{\circ} 54' 37''$. Then, in the $\triangle ZAC$ are known all the Sides, ZC (the Complement of the 1st Alt.)



$= 76^{\circ} 10'$, ZA (the Complement of the 2d Alt.) $= 69^{\circ} 36'$, and AC $= 2BC = 21^{\circ} 43' 17''$; to find $\angle ACZ = 69^{\circ} 23' 51''$, and thence $\angle ZCP (= ACP - ACZ) = 24^{\circ} 30' 46''$. And, lastly, in the $\triangle ZCP$, are known ZC, PC, and their included $\angle ZCP$, to determine ZP (the Complement of the Latitude) $= 41^{\circ} 12' 30''$, and therefore the Latitude itself $= 48^{\circ} 47' 30''$, [unlike Mr. Maskelyne's erroneous one of $48^{\circ} 45'$, deduced from a Fiction], and from thence the Times of Observation will be found $= 9^h 29^m 13^s$ and $11^h 1^m 30^s$ [and not $9^h 24^m 21^s$ and $10^h 56^m 38^s$, as given in *Quest.* by Mr. Maskelyne] but when the Times of Observation can be truly had, the Latitude may be determined at first from the $\triangle s$ ZAP or ZCP; for then there will be given two Sides and an \angle opposite to one of them, to find the third Side ZP. — In this Solution it would have been the same Thing to have found $\angle ZAC$ and thence $\angle ZAP$, as to find $\angle ACZ$ and $\angle ZCA$; for we should then have the Sides ZA, PA, and their included $\angle A$, given, to find ZP.

XVI. QUESTION 416, answered by Mr. Judson, of Beverly.

LET the given Expression $x^{\frac{1}{3}} |^{2x}$ be reduced to $x^{\frac{x}{3}}$, a Maximum. Put $x =$

Hyp. Log. x , then, $x \times \frac{x}{3}$, the of Log. $x^{\frac{x}{3}}$, is a Minimum, not a Maxi-

num. — Whence, Hyp. Log. $x \times x$ is a Minimum. — In Fluxions, $\frac{\dot{x}}{x} x + \dot{x} x$

$=$ a Minimum. Whence, $x = -1 = \text{Hyp. } x$; and, as $2.30258509 : 1 :: -1 : -.43429448$, com. Log. x ; this divided by 3 $=$ com. Log. $x \times \frac{x}{3} = -.14476482$, whose Complement $= 1.85523518$, whose natural

Number corresponding $= .7165311 = 8d. 2 gr. \&c.$ W. W. R.

N. B. $x = .367879$, $\&c.$

Mr. George Coughron, of Wreighbill, Northumberland, judiciously observes, that the Expression has only a Minimum, and no Maximum; because x^x has only a Minimum, to which it reduces). Who finds $x = .3678794$, $\&c.$ accurately.

XVII. QUESTION 417, answered by Mr. R. Judson.

BY comparing each Eq. with the other, we get $x^2 = \frac{4y^2 + 3z^2 - 12y - 12z}{6}$

$= \frac{zy + z^2 - y^2}{2z} = \frac{4y^2z + 3z^3 - 12yz}{30z}$; by comparing any two of which,

there arises, universally, $4y^2z + 3y^2 - 15yz = 15z^2 - 3z^3$. Now, putting ay for z , we get $4ay^3 + 3y^2 - 15y^2a = 15a^2y^2 - 3a^3y^3$, and, dividing by y^2 ,

we get, $4ay + 3 - 15a = 15a^2 - 3a^3y$; therefore $y = \frac{15a^2 + 15a - 3}{4a + 3a^3}$;

and $x = \frac{15a^2 + 15a - 3}{3a^2 + 4}$; and putting the Values of y and z into one of the

foregoing Equations of x^2 , we have $\frac{a^2+a-1}{2a} \times \frac{15a^2+15a-3}{4a+3a^3} \Big| \frac{1}{2}$; being 3
universal Theorems for the Values of x , y , and z , let a be what it will. If a
 $= 2$, then $x = 3.3984375 \Big| \frac{1}{2}$, $y = 2.71875$, and $z = 5.4375$. But, by
the *Question*, one of the Numbers is required to be a *whole* Number. There-
fore, if $a = \frac{23}{15}$: Then, $x = \frac{3245}{1058} \Big| \frac{1}{2}$, $y = \frac{75}{23}$, and $z = 5$, a whole Num-
ber. W. W. R.

Mr. Robinson, of Biddick, changing the *Data*, sends $x^2+y+z = \frac{x^2}{2} +$

$$\frac{y^2}{3} + \frac{z^2}{4} = 3x + \frac{y^2}{3} + z.$$

	1	$\frac{x^2}{2} + \frac{y^2}{3} + \frac{z^2}{4} = 3x + \frac{y^2}{3} + z.$
1 red.	2	$2x^2 - 12x - 4z - z^2.$
Then	3	$x^2 + y + z = \frac{9x + y^2 + z}{3},$
3 red.	4	$y^2 - 3y = 3x^2 - 9x.$
4 comp. Sq.	5	$y^2 - 3y + \frac{9}{4} = 3x^2 - 9x + \frac{9}{4}.$
5 evolv.	6	$y = \sqrt{3x^2 - 9x + \frac{9}{4}} : + \frac{3}{2} = 1. \text{ Theorem.}$
2	7	$x^2 - 6x = \frac{4z - z^2}{2}.$
7 comp. Sq. and evolv.	8	$x = \sqrt{\frac{4z - z^2}{2}} + 3 : + 3 = 2. \text{ Theorem.}$
Also	9	$z = \sqrt{12x - 2x^2 + 4} : + 2 = 3. \text{ Theorem.}$
	10	or $x = \sqrt{\frac{y^2 - 3y}{3} + \frac{9}{4}} : + \frac{3}{2}. \text{ Hence, } x=6, y=$

[9, $z=4$, required.]

Mr. William Hardy, of Cottingham, the Proposer, answered it according to the *printed* Equations as he sent them. In one Case, he finds $x = 1.64982$ and $y = 3.54603$; and $z = 4.61966$. In another Case, $y = 0$, $x = \sqrt{\frac{30}{12}} = \sqrt{\frac{5}{2}}$, or $x^2 = \frac{5}{2} = 2.5$, $z = 5$, by a *Process* different to Mr. Judson's.

Mr. George Coughron, of Wreighbill, gave a *general* Solution in *Surds*; but whether those *Surds* would afford *whole* Numbers, he did not stay to try.

XVIII. QUESTION 418, answered by Mr. R. Judson.

PUT x = Length of the Day, then that of the Night will be $= \frac{8x}{15}$;

but $x + \frac{8x}{15} = 24$; th. $23x = 360$, and $x = \frac{360}{23} = 15^h.6521$, the Length of the Day; and therefore 8.3479 the Length of the Night. Also $\frac{15.6521}{2} = 7.82605$ = Time of Sun-Setting; and 6 taken therefrom,

rem. 1.82605 , the *Asc. Diff.* which multiplied by 15, the Degrees in an Hour, gives $27^{\circ}.39075 = 27^{\circ} 23'.445$ for the *Asc. Diff.* — Then, As *Tan. Declin.* $23^{\circ} 28' 30''$: *Rad.* :: *Sine Asc. Diff.* $27^{\circ} 23'.445$: *Tan.* $46^{\circ} 39'$, the Latitude, required.

Mr. Alexander Rowe, by a similar and concise Process, makes the Latitude $46^{\circ} 38' 21''$.

Mr. Robinson, of Biddick, makes the Latitude, by his Method, $46^{\circ} 37'$.

Mr. Richard Dalton, of Pool, makes the Latitude, by a short Process, $46^{\circ} 43'$, nearly as above.

But, Mr. George Coughron, of Wreighbill, Northumberland, who computes in the same Manner, with great Care and Judgement, makes the Latitude $46^{\circ} 39' 27''$, confirming Mr. Judson's Conclusion.

XIX. QUESTION 419, answered by Mr. R. Judson.

SINCE all similar Solids are to one another as the Cubes of their homologous or like Sides, it will be, As 18.5^3 : 1 (supposing the Content of the Cope upon the Bushel to be Unity) :: 12.5^3 : .30847136, the Content of the Cope of the Half Bushel; which multiplied by 2 gives .61694272, the Contents of the Copes of 2 Half Bushels. Then, $1 - .61694272 = .38305728$, the Part the Buyer loses of the Cope of each Bushel, when he buys them by the Half-Bushel Measure, which is more than one-third Part of the Cope of the whole Bushel. W. W. R.

Mr. Alexander Rowe puts $2a = 18.5$ Inches = Diameter, and $b = 8$ = the Height of the Standard Bushel, $2c = 12.5$ = Diameter, and $d = 8.5$ Inches = the Depth of the Half-Bushel; and $3e = .7854$. Then, the Bushel $= 4a^2 \times 38 \times b = 2150.4252 = f$; and the Half-Bushel $= 4c^2 \times 3e \times d = 1043.109375$ cubic Inches = g . — Now, admitting the Altitude of the Cone, or Cope, to be equal to Half the Diameter of each respectively; then the Bushel Cope $= 4a^3 \times e = 828.8097125 = b$; and the Half-Bushel Cope $= 4c^3 \times e = 255.6640625 = i$. Whence $f + b - g + 2 \times 2 = 381.6880375$ solid Inches gained by the Merchant, or lost by the Buyer, in using the Half-Bushel instead of the Bushel Measure, required.

N. B. This Quantity lost or gained is more than the eighth Part of a Bushel.

Mr. Stephen Hartley, of Sowerby-Bridge, proves in his Answer as follows.

THERE is given (in this Question) the Base of any Cone, to find its Solidity when a Maximum.

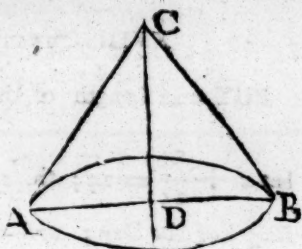
Let

Let ABC represent such a Cone: Put $AB=2a$,
 x and $y = \text{Sine and Cos. of } \angle DAC$; $\text{Rad.} = 1$;

$b=.7854$: Then, by Trig. $\frac{ax}{y} = CD$, and

the Cone's Solidity will be $\frac{4ba^3x}{3y}$. In Flux-

ions, $\frac{\dot{x}-y}{9y^2}=0$; but $\dot{x}=\frac{-\dot{y}y}{x}$; Th. $\frac{y\dot{y}}{x}=y$, and $y=x$; hence $a=CD$.



From this *Theorem*, the *Busbel* up-heaped will contain 2979.2349125 *solid Inches*; and twice the *Half-Busbel* up-heaped will contain 2597.546875 *solid Inches*; their *Difference* is 381.688075, which gives a *Busbel* saved in measuring out by the *Half-Busbel*, in every 7.805 *Busbels*.

N. B. The above *Computation* amounts to almost one-eighth *Gain* or *Loss* to the *Seller* or *Buyer*. — Nearly equal to *Mr. Alexander Rowe's* *Calculation*.

Mr. William Wells, Teacher at *Crowle School*, *Lincolnshire*, from the same *errring Principle*, of making the *Height* of the *Busbel* and *Half-Busbel Cope* = to the *Semidiameter* of the *Busbel* and *Half-Busbel* respectively, (and of any other *Cone*, or *Cope*, equal to the *Semidiameter* of its *Base*), has computed the *Solidity* of the *Busbel-Cope* = 828.72001145; and the *Solidity* of the *Half-Busbel Cope*, 255.72315625 *Inches*. Therefore, 828.72001145 — 255.72315625 doubled + 64.20645 (the *Difference* or *Excess* that the *Cylindrical Content* of the *Busbel* is greater than twice the *Cylindrical Content* of the *Half-Busbel*) = 381.48014895 *solid Inches*, which is the *Merchant's Gain per Busbel*, in selling by the *Half-Busbel* instead of by the *Busbel Measure*. W. W. R.

Mr. George Coughron, of *Wreighbill*, *Northumberland*, supposes the *Content* of the *Half-Busbel Cope* = $1653.645 \times .7854$ *solid Inches*, the *Cope* making an \angle of 45 with the *Side* of the *Busbel* and *Half-Busbel*; and the *Content* of the *Busbel* and *Cope* = $3793.2708 \times .7854$. — Whence he computes the *Merchant's Gain per Cent.* 14l. 13s. 10d. 2q. .4, and the *Buyer's Loss per Cent.* 12l. 16s. 2d. 1q. .5. — But if the *Content* of the *Half-Busbel* = $1369 \times .7854$ *Inches*, then the *Merchant's Gain per Cent.* = 11l. 18s. 6d. 2q. .43, and the *Buyer's Loss*, 10l. 13s. 1d. 2q. .21. — That, if the *Height* of the *Half-Busbel* had been given $8\frac{1}{2}$ *Inches*, its *Content* had been near Half the *Winchester Busbel*.

Mr. Richard Dalton, of *Pool*, says, he finds, by several *Trials*, that the *Cope's* *Altitude* sensibly differs, according to the *Quality* of the *Coal* measured. For large *Coals*, he says, will give the *Altitude* much less, and small *Coals* much greater; and the thicker the *Busbel's* *Brim*, the higher will be the *Altitude*, when the *Diameter* is taken within the *Busbel*. Therefore, he thinks, that there is no other *Method* of answering this *Question*, than by making a *Number* of *Trials* to ascertain the *Proportion* of *Difference*, in using the *Difference* of *Measures*; and that not exactly. That it is a very useful *Question*, and for *Want* of such *Trials* and *Discoveries*, many rich as well as poor *Men* have been great *Sufferers*. — That he measured several different *Sorts* of *Coal*, and from a *Mean* of the whole, he found that the *Cone's* *Height* on the *Standard Busbel* = 9 *Inches*, which he puts = a ; that the *Cone's* *Height* on the *Half-Busbel* = 7 = b . Whence he finds the *Solidity* of the *former* (its *Diameter* and *Height* being

being $= 18.5 = c$, and $8 = d$) is $= \frac{pa}{3} \times e^2 = 306.4 = k$; and the So-

lidity of the Cone on the Half-Bushel $= \frac{pb}{3} \times e^2 = 286.3 = b$ (p being $=$

.7854 and $e = 12.5$), and also the Solidity of the Bushel $= 2150.42$, and of the Half-Bushel 1043.12; where, it is evident, that the Half-Bushel is *too little* by 64.2 solid Inches. Now, $b \times 2$ should be $= k$, that the Buyer may have fair Play; but $k - 2b = 233.8$ solid Inches; which is nearly as 4 to 37. That is, the Merchant gains 4 Standard-Bushels in 37 Half-Bushels, at least, by the false Measure, from the Half-Bushel Cope only; and gains 1 Bushel in 31 Half-Bushels from the Defect of the cylindrical Part of the Half-Bushel: Being a long-continued Imposition, or Fraud, that calls aloud for Redress. W. W. R.

XX. QUESTION 420, answered by the Proposer, Capt. Edward Williams, of Woolwich.

LET ABC be the given Cone, and draw Lines as per Figure. Put $BD = 45 = a = AC$, then $BC =$

$$\sqrt{a^2 + \frac{a^2}{4}} = \frac{1}{2}a\sqrt{5}; \text{ and the similar right-}$$

angled Triangles, BDA, BPp, give $BA : AD :$

$$AD :: 2AD : Pp = \frac{a}{1 + \sqrt{5}}; \text{ Th. } BP = a - Pp$$

$$= a - \frac{a}{1 + \sqrt{5}} = \frac{a\sqrt{5}}{1 + \sqrt{5}}, \text{ which put } = d.$$

Also, $BD : DA :: 2 : 1 :: 1 : \frac{1}{2} = \text{Tan. Ang. } A$
 $ABD = 26^\circ 33' 54''$, whose nat. Sine let $= s = 0.447213$. Then, $Pp =$

sd ; also $BA = BP - Pp - Qq$; theref. $s \times BQ = Qq = s \times BP - Pp - Qq$;

th. $Qq = \frac{s}{1+s} \times BP - Pp = sd \times \frac{1-s}{1+s}$, and $BQ = \frac{Qq}{s} = d \times \frac{1-s}{1+s}$;

also $BQ - Qq = d \times \frac{1-s}{1+s}$. In like Manner, $\frac{s}{1+s} \times BQ - Qq = Rr$

$= ds \times \frac{1-s}{1+s}$, and $BR = \frac{Rr}{s} = d \times \frac{1-s}{1+s}$; Therefore, $BR - Rr = d \times$

$\frac{1-s}{1+s}$. Again, $\frac{s}{1+s} \times BR - Rr = Ss = ds \times \frac{1-s}{1+s}$: Hence the

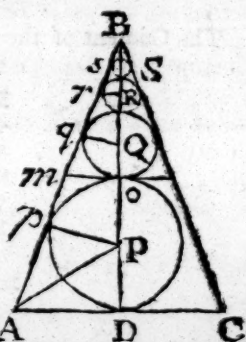
Law of the Radius of the n th Globe being $= ds \times \frac{1-s}{1+s}^{n-1}$, if $\frac{1-s}{1+s} = r$,

and $2dp = p$, the Diameters of the Globes will be $p, pr, pr^2, pr^3, \&c.$ —

pr^{n-1} ; and, if $n = 0.5236$, the Solidities of the several Globes will be $np^3,$

$np^3r^3, np^3r^6, np^3r^9, \&c.$ — np^3r^{3n-3} ; which are a Series of Terms in geometrical Progression, whose Ratio is r^3 , and 1st Term $= np^3$, and last

Term



Term $= mp^{3r} 3^{a-3}$. Therefore, the Sum of the Series $= mp^3 \times \frac{1-n^{135}}{1-n^3}$
 $= 12373$; and $12373 \times 10.36 \times 4 = \text{£. } 512737.12 = \text{the Value required.}$

Mr. W. Oliver, of Beamister, answered it as follows.

SINCE the Sides of the Triangle ABC are given, the Angles are easily had by Trigonometry. Th. As AD : Rad. :: BD : Tan. $\angle BAD 63^\circ 26' .4847$; Half of which $= \text{Ang. PAD} = 31^\circ 43' .2423$. Then, in Triangle PAD are given AD, and Angle PAD, to find DP, the Radius of the greatest Globe $= 13.90751$, doubled $= 27.815036 = \text{its Diameter, which taken from } 45 = \text{BD, viz. BD-Do} = \text{Bo} = 17.184963$, the next Cone's Height; the Half of which $= 8.592481 = m$, Half that Cone's Base; whence

$10.6222282 = \text{Diameter of the 2d Globe}$; and $\frac{10.6222282}{27.815036} = .381887$, the

Ratio of the Diameters of all the succeeding Globes.

To find the Contents of 45 such Globes.

The Content of the 1st Globe is found $= 11267.757739$

2d Globe	- - -	$= 627.540906$
3d Ditto	- - -	$= 34.9499541$
4th	- - -	$= 1.946486$
5th	- - -	$= 0.108407$
6th	- - -	$= 0.006037545$
7th	- - -	$= 0.00033625$
8th	- - -	$= 0.000018727$
9th	- - -	$= 0.0000010429$
10th	- - -	$= 0.000000058086$

11932.309885722986

Multiply by the Value of 1 solid Inch of Gold 41.44

Product $= 494474.9 +$

Equal in Value to $494474\text{ l. } 18\text{ s.}$ the required Value of all the Globes.

N. B. That laborious Computation may not be lost, we have inserted the foregoing to be examined and compared with other Answers.

Mr. Robinson, of Eiddick, considers only 4 Globes inscribed in the given Cone; 3 lesser ones, one at each of the Angles touching the greater Globe inscribed in the Middle, whose Diameter he finds $= 27.811$ Inches; and each of the two equal lesser Globes Diameters, at the Base, he finds $= 6.328$; and the upper Globe's Diameter $= 10.626$. Whence he finds the Solidity of these 4 Globes (which answers not the Words of the Question, 45 Globes, successively inscribed) 12556.452 solid In. and the Value thereof 503763.37088 l. — A Misconception.

Mr. William Pen, of Chalfont, took some Pains to answer this Question, making the Solidity of all the Globes $= 43552$ Inches; which multiplied into $10.36 \times 4 = 1804794.88\text{ l.}$ their Worth, according to his Calculation.

Saying, (because it comes near an infinite Number of Globes), As the Difference of the 2 1st Globes, or greatest Terms (which he made 38756.34) to the 2d Term (which he made 2327.8708) so is the 1st Term or Globe (41084.2108 solid Inches) to the Sum of the Rest.

Viz.

Viz. 2467.6923
 Second = 2327.8708
 First = 38756.34

Sum of all = 43551.9031

N. B. *The foregoing Question is answerable by an infinite Number of Globes inscribed, and will admit of an elegant Solution.* PALLADIUM-AUTHOR.

Mr. George Coughron, of Wreighbill, says, it is evident, *per similes* Figures, (let the Ratio of the Cone's Base to its Perpendicular be what it will) that the whole Altitude of the Cone is to the Altitude above the 1st Globe as the Altitude above the 1st Globe to the Altitude above the 2d; and as the Altitude above the 2d to the Altitude above the 3d; and as the Altitude above the 3d to the Altitude above the 4th, &c. also that the Diameter of each Globe is to the Altitude of the Part of the Cone in which they are inscribed, as the Diameter of the 1st Globe to the whole Altitude: whence if a be put for the Altitude of the Cone, ab for the Diameter of the 1st or greatest Globe inscribed therein, ac for the Altitude of the Part above this Globe, n for the Number of Globes, and p for 5235987756, &c. it follows, that abc will be the Diameter of the 2d Globe; abc^2 of the 3d; abc^3 of the 4th; and, consequently,

abc^{n-1} the Diameter of the n th Globe. Therefore the Sum of their Solidities = $pa^3b^3 \times 1 + c^3 + c^6 + c^9 \dots c^{3n-3}$ Terms = $pa^3b^3 \times \frac{1-c^{3n}}{1-c^3} =$

$pa^3b^3 \times \frac{1}{1-c^3}$, when n is infinite; because then c^{3n} vanishes, and even, in

the present Case, c^{3n} may be safely rejected, as being so very small as not to cause an Error in 54 or 55 Places of Decimals; that since the Diameter and

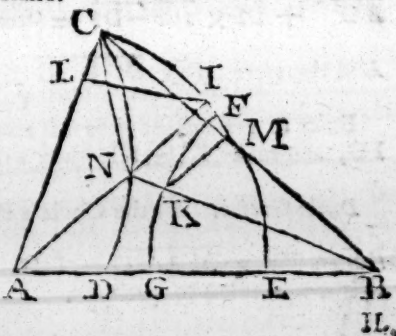
Altitude of the Cone are equal, b will be = $\frac{2}{\sqrt{5}+1}$, and $c = \frac{\sqrt{5}-1}{\sqrt{5}+1}$, &

therefore $pa^3b^3 \times \frac{1}{1-c^3} = pa^3 \times \frac{1}{\sqrt{5}+2} \times \frac{\sqrt{5}+2}{4} = \frac{1}{4}pa^3 =$

twice the Solidity of the Sphere whose Diameter is $\frac{1}{2}a$; and the required Value = $pa^3 \times 10.36 = 4943061.10s. 10d.$ corresponding (in the 1st three Figures) with Mr. Oliver's Solution.

XXI. QUESTION 421, answered by Mr. George Coughron, of Wreighbill, Northumberland.

LET ABC be the given Δ , and D the Position of the House, which must be when the Perpendicular from C cuts AB; because the Sides AC, BC, cannot appear under equal \angle s at any other Point of AB. — From A as a Center, and AC Rad. describe the Arc CE, and from B, as a Center, with same Rad. describe FG; to any Point I, in CE, draw AI, and then BKN, so that the Perpendicular KM may be to the Perpendicular



IL, as AC to BC; and their *Intersection*, at N, will be in the *required Walk*.

For, since the *Arcs*, CE and FG have the same *Radii*, IL, KM, will be as the *Sines* of \angle s NAC, NBC; and therefore, $AC : BC :: S. \angle NBC : S. \angle NAC$; th. $AC \times S. \angle NAC = BC \times S. \angle NBC$; and if CN be drawn, $AC : CN :: S. \angle ANC : S. \angle NAC$, whence $AC \times S. \angle NAC = CN \times S. \angle ANC = BC \times S. \angle NBC$. Therefore, $S. \angle NBC : CN :: S. \angle ANC : BC :: S. \angle BNC : BC$. Consequently $\angle ANC = BNC$, as every where required.

In the same Manner, any Number of Points may be determined. And, by drawing a Curve-Line through all those Points, the Figure of the required Walk will be known. Whose Length must be determined from the Equation thereof first investigated, according to Construction.

PRIZE-QUESTION answered by Mr. George Coughron, of Wreighhill,
Northumberland.

LET AB and CD represent the Towers, AC their horizontal Distance, ED the Difference of their Heights, and F and G the Points where the Shot and Ball struck each other; then, by the Laws of descending Bodies, DF and DG are to each other, as the Squares of the Times of their

Description. And, by uniform Motion, \overline{BF}^2 is to \overline{BG}^2 as the Squares of the Times of their Description.

Therefore, since these Times are equal, we shall have, $DF : DG :: \overline{BF}^2 : \overline{BG}^2$, or $DG \times \overline{BF}^2 = DF \times \overline{BG}^2$. But DG multiplied by $\overline{BF}^2 = DF + FG \times \overline{BF}^2 = DF \times \overline{BF}^2 + FG \times \overline{BF}^2$. And $\overline{BG}^2 = \overline{BE}^2 + \overline{EF} + \overline{FG}^2 = \overline{BE}^2 + \overline{EF}^2 + 2\overline{EF} \times \overline{FG} + \overline{FG}^2 = \overline{BF}^2 + \overline{2\overline{EF} + \overline{FG}} \times \overline{FG}$; consequently, $DF \times \overline{BF}^2 + FG \times \overline{BF}^2 = DF \times \overline{BF}^2 + \overline{2\overline{EF} + \overline{FG}} \times \overline{FG}^2 \times DF$.

$$\text{Or, } BF^2 = DF \times \overline{2EF + FG}.$$

Furthermore. If EH be made = EF, and BH be drawn, then by simple Geometry, Cor. to Prop. 23. B. 3. $\overline{BF}^2 = BD^2 + DF \times DF \times DH = \overline{BD}^2 + DF \times \overline{2EF - DF} =$ (from what's done above) $DF \times \overline{2EF + FG}$.

And therefore $DF \times \overline{DF + FG} = BD^2$. Whence follows this easy
Construction.

Erect FI perpendicular to CD and equal to BD; draw IK to the Center of FG, and make KD=KI, then will D be the Top of the *biggest* Tower.

Demonstration. By the Circle's Property, $IL \times IL + 2KL = FI^2 = BD^2$,
that is, $DF \times DF + FG = BD^2$. The Rest of the Construction is so easy,
that it is needless to specify it.

Calculation:

Calculation. $KD = KI = \sqrt{FI^2 + FK^2} = \sqrt{BD^2 + \frac{1}{4}FG^2} = \sqrt{BE^2 + ED^2 + \frac{1}{4}FG^2} = \sqrt{2517}$ Yards $= 50.1697119784$; whence the Heights of the Towers are found $= 49.1697119784$ and 53.1697119784 ; $BF = \sqrt{FE^2 + BE^2} = 67.3817696429$ Yards and $BG = \sqrt{GE^2 + BE^2} = 68.7185025159$; which being known, the required Angles of *Depression*, EBF , EBG , $= 42^\circ 5' 40''$ and $43^\circ 19' 53''\frac{1}{2}$, respectively. And the Velocity $= 22.249537338$ Yards per Second, the Time of the Ball's falling through DF , being $= 3.0284571143$, &c.

Mr. Alexander Rowe's Answer.

PUT $AB = gb = ef = 150$ Feet $= a$; $16\frac{1}{12}$ Feet $= s$; $AC = Df = x$; $Ce = x - 12$; $Cg = x - 6$; $Db = x + 6$; and $y =$ Velocity of the Shot per Second. Then, by 47.e. 1. $\sqrt{ef^2 + Ce^2} = Cf = \sqrt{a^2 + x - 12^2}$; and $\sqrt{gb^2 + Cg^2} = \sqrt{a^2 + x - 6^2}$. Now, by the Laws of Gravity, $\frac{x}{s} \Big|^\frac{1}{2} =$ Time of the Ball's Descent from D to f , and $\frac{x+6}{s} \Big|^\frac{1}{2} =$ Time of its falling the Height or Distance Db in Seconds. Whence, by *Question*, $\frac{a^2 + x - 12^2}{y} \Big|^\frac{1}{2} = \sqrt{\frac{x}{s}}$, and $\frac{a^2 + x - 6^2}{y} \Big|^\frac{1}{2} = \sqrt{\frac{x+6}{s}}$. From these Equations we have $y^2 = \frac{s \times a^2 + x - 12^2}{x} = \frac{s \times a^2 + x - 6^2}{x+6}$. Reduced, by putting $-2m = -12$, and $-m = -6$, we get $x^2 + 6x = a^2 + 4m^2$, and $x = a^2 + 4m^2 + 9 \Big|^\frac{1}{2}$, $-3 = 147.51$ Feet, nearly $= 49.17$ Yards $= AC =$ Height of the lower Tower; $BD = 159.51 = 53.17$ Yards $=$ Height of the higher Tower; $y = 66.7486$ Feet $= 22.2495$ Yards $=$ Space the Shot moves through per Second: And thence, by Trigonometry, the $\angle Cf = 47^\circ 54' 19''$, and $\angle Cb = 46^\circ 40' 5''$ (the Complements of these Angles agreeing with Mr. Coughbron's Angles), the respective Directions: Consequently the Problem is easily constructed. Q. E. F.

Mr. Buddle, of Kyo, near Lancaster, determines, by a short Process, the Height of the lowest Tower $= 49.169712$, and of the highest, 53.169712 Yards.

Mr. William Oliver, of Beamister, gave an elegant Construction, Demonstration, and Calculation, to the same, which we have not Room for.

His Chance for the Prize-Palladiums was determined by Lot; Mr. Coughbron having won the 12 Prize-Palladiums, by Lot, against all others.

Gemini, of Morpeth, and Mr. William Wilky, of Greenleighton, Northumberland, both answered the Prize-Question in the very same Words and Method, viz. 49.169412 , and 53.469412 Yards, the two Towers Heights, and 1485.09 , &c. Yards per Second Velocity, (the last a wide Difference), having seen each other's Numbers and Solution.

Captain *Williams*, the Proposer, gave an *elegant Solution and Construction*, for which we have not Room, agreeing with Mr. *Coughron's* and others Solutions; also confirming their Numbers:

Mr. *Wm Hardy*, Master of *Cottingham School*, near *Hull*, solved the *Prize-Question* by a *geometrical Construction and algebraic Process*. He determined the Height of the *highest Tower* 53.169 Yards, and of the *lowest* 49.169. That the Shot first fired from the Top of the lower Tower, which struck the Ball 12 Feet from the Ground, that was let fall from the Top of the higher Tower, at the Time that Shot was fired, was 3.0289 Seconds in its Passage; and that the Shot fired the 2d Time, from the Top of the lower Tower, was 3.1492 Seconds in its Passage, when it struck the falling Ball, 6 Feet from the Ground.

✍ We recommend to every Contributor to draw their Schemes correct, and of a Size fit for the Palladium; to save what Room they can, and the Compiler the Trouble of reducing or altering improper or inelegant Schemes. And every one who would wear Laurels must win them, like Cap. Williams, Mr. Coughron, Mr. Hardy, &c.

CORRECTIONS of last Year's PALLADIUM.

P. L. Read

32. 6. from the Bottom, for *transplant*, *supplant*.

33. 21. from the Bottom, for *subfisted*, *subfided*.

$$36. 10. \text{Th. } \frac{5x}{6} - \frac{4x}{y} = 1.$$

$$38. 6. \sqrt[3]{r^6} + \sqrt{n^2}.$$

40. 15. as 1.215 to 1, for 1 to 1.215, or as 16 oz. Avoirdupoize to 13.160826 oz. Avoirdupoize in 1 lb. Troy.

47. 6. from the Bottom, Quere.

$$49. 5. n : x = \frac{a^2}{n} =$$

$$51. 9. \text{fr. Bot. } r - \frac{ax}{b} = \frac{a}{b} \times b - x. \text{ Conf. } px^2 \times \frac{a}{3b} \times b - x.$$

52. 15. XX. QUESTION instead of XIX.

53. 3. DHG parallel.

68. 35. For *have*, *Half*.

74. 30. For *Weight*, *weighs*:

TIDE-TABLE for PORTSMOUTH-HARBOUR.

Moon's Age.		Time.		Moon's Age.		Time.	
Days.	Days.	Hours.	Minutes.	Days.	Days.	Hours.	Minutes.
0	---	30	11 --- 12	8	---	23	5 --- 39
1	---	16	12 --- 3	9	---	24	6 --- 27
2	---	17	12 --- 51	10	---	25	7 --- 15
3	---	18	1 --- 39	11	---	26	8 --- 3
4	---	19	2 --- 27	12	---	27	8 --- 51
5	---	20	3 --- 15	13	---	28	9 --- 39
6	---	21	4 --- 3	14	---	29	10 --- 27
7	---	22	4 --- 51	15	---	30	11 --- 15

A MECHANICAL and UNIVERSAL RULE of PROPORTION.

By the PALLADIUM-AUTHOR.

Founded on Cross-Multiplication, of the Products of contrary Cause and Effect, being equal,

Answering, by one direct, easy, and general, METHOD, every Thing that can be resolved by the Direct, Inverse, and every Way compounded, Rule of Three. Requiring the least Attention, and suited to every Capacity.

For the Use of all Persons concerned in Reckonings of Proportion.

GENERAL RULE. 1. Set down, in the first Part of a first Line, all the leading Terms or Conditions of a Question, in any Order, considered as the first Cause, with the Word or Words of Affection thereto; then set down, in the second Part of the first Line, the following Terms or Conditions, in any Order, considered as the first Effect produced by the first Cause.

2. Set down, in the first Part of a second Line, at some Distance from, and directly under, the Terms of the first Line, the second like preceding Terms or Conditions, each under each, in the same Order with those above them, considered as a second Cause, with the same Word or Words of Affection, as before; and then set down, in the second Part of the second Line, the second like following Conditions, each under each, in the same Order with those above them, considered as the second Effect produced by its preceding or second Cause; always marking the Term sought, in this second Line, where it is found deficient, by a Star, or Asterism, *.

3. Draw contrary or cross Lines; i. e. from the Cause, Term, or Terms, in the first Part of the first Line, to the Effect, Term, or Terms, in the second Part of the second Line; and from the Effect, Term, or Terms, in the second Part of the first Line, to the Cause, Term, or Terms, in the first Part of the second Line.

4. Multiply the Term or Terms in the Part of the second Line, wherein the Star Term is found, (whether in Cause or Effect), into the contrary Term or Terms, in the first Line, (standing at contrary Ends of the same Cross-Line), for a DIVISOR.

5. Multiply also all the Terms together, standing at contrary Ends of the other Cross-Line, for a DIVIDEND.

6. The Quotient arising from this Divisor and Dividend (after reducing the Fraction to its least or lowest Terms, by dividing the Dividend and Divisor by different equal Quantities) will give the true Answer, in all Cases whatsoever.

N. B. When a Term is understood, the Place of it must be supplied or marked with an Unit, or 1.

The foregoing Mechanical RULE exemplified, in ANSWERS given to several QUESTIONS in Mr. EMERSON'S ARITHMETIC, from P. 105 to 115.

EXAMPLE I. If 18 lb. Sugar cost 12 Shillings, what will 150 lb. cost?

	Cause.	cost	Effect.		
Line 1	{	18l.	{	12s.	{
2		150l.		*	
		cost			

$$\frac{150 \times 12}{18} = \frac{150 \times 2}{3} = 50 \times 2 = 100s. \text{ or } 5l.$$

[Answer.]

N. B. In the Rule of Proportion, if a greater Quantity require a greater, or less require a less, in the Terms of the Question, it is called the Rule of Three Direct.

But if a greater Quantity requires a less, or a less a greater, it is called the Rule of Three Inverse; always stating the Question so, that the 1st and 3d Terms

Terms given may be of the *same Name*, when the 4th Term sought will be of the *same Name* with the 2d; wherein the *Rule* is, if *more* be required to mark the *lesser Extreme*, if *less* to mark the *greater Extreme*, for a *Divisor*, and to multiply the other Terms together for a *Dividend*, when the *Quotient* will be the *Answer*. In which *Rule* a close Attention, or Consideration, is often required, But the foregoing *universal Rule of Proportion* answers all Questions *mechanically*, without making the said *Distinctions*.

EXAMPLE II. If 6 Men in 10 Days finish a Piece of Work, how long will 8 Men be in finishing the same?

N. B. Here the *same Piece of Work* must be marked 1 for the *same Work*.

$$\begin{array}{l} \text{Cause.} \quad \text{finish} \quad \text{Effect.} \\ \text{Line 1 } \left\{ \begin{array}{l} 6 \text{ M. } 10 \text{ D.} \\ 2 \left\{ \begin{array}{l} 8 \\ * \end{array} \right\} \end{array} \right. \quad \left\{ \begin{array}{l} 1 \text{ W.} \\ 1 \end{array} \right\} \quad \frac{6 \cdot 10 \times 1}{8 \times 1} = \frac{60}{8} = 7\frac{1}{2}, \text{ Answer.} \end{array}$$

EXAMPLE III. If I lend a Person 300l. for 1 Year, how long ought he to lend me 500l. to do me an equal Service?

N. B. Here the *same Service or Interest of Money* must be marked with 1.

$$\begin{array}{l} \text{Cause.} \quad \text{gain} \quad \text{Effect.} \\ \text{Line 1 } \left\{ \begin{array}{l} 300\text{l. } 365^{\text{d}} \\ 2 \left\{ \begin{array}{l} 500 \\ * \end{array} \right\} \end{array} \right. \quad \left\{ \begin{array}{l} 1 \text{ Int.} \\ 1 \end{array} \right\} \quad \frac{300 \cdot 365 \times 1}{500 \times 1} = \frac{3 \cdot 365}{5} = 3 \times 73 = \\ \text{gain} \quad \quad \quad [219 \text{ Days. Answer.}] \end{array}$$

EXAMPLE IV. How many Yards of Cloth in Length, a Yard and a Quarter broad, will line a Piece of Tapestry 10 Yards long and $3\frac{1}{2}$ broad?

N. B. Here the *same Area* must be marked 1.

$$\begin{array}{l} \text{Cause.} \quad \text{Area} \quad \text{Effect.} \\ \text{Line 1 } \left\{ \begin{array}{l} 10 \text{ l. } 3\frac{1}{2} \text{ b.} \\ 2 \left\{ \begin{array}{l} * \\ 1\frac{1}{4} \end{array} \right\} \end{array} \right. \quad \left\{ \begin{array}{l} 1^{\text{a}} \\ 1^{\text{a}} \end{array} \right\} \quad \frac{10 \cdot \frac{7}{2} \times 1}{\frac{5}{4} \times 1} = \frac{10 \cdot 7 \cdot 4}{2 \cdot 5} = \frac{10 \cdot 14}{5} = \\ \text{Area} \quad \quad \quad [2 \times 14 = 28 \text{ long. Answer.}] \end{array}$$

EXAMPLE V. If 16 Horses in 6 Days eat 9 Bushels of Oats, how many Horses will eat 24 Bushels in 7 Days?

$$\begin{array}{l} \text{Cause.} \quad \text{eat} \quad \text{Effect.} \\ \text{Line 1 } \left\{ \begin{array}{l} 16^{\text{h}} 6^{\text{d}} \\ 2 \left\{ \begin{array}{l} * \\ 7 \end{array} \right\} \end{array} \right. \quad \left\{ \begin{array}{l} 9^{\text{b}} \\ 24 \end{array} \right\} \quad \frac{16 \cdot 6 \times 24}{7 \times 9} = \frac{16 \cdot 6 \cdot 8}{7 \cdot 3} = \frac{16 \cdot 2 \cdot 8}{7} = \\ \text{eat} \quad \quad \quad \left[\frac{256}{7} = 36\frac{4}{7} \text{ Horses. Answer.} \right] \end{array}$$

EXAMPLE VI. If 9 Students spend 12 Pounds in 8 Months, how much will serve 24 Students 16 Months?

$$\begin{array}{l} \text{Cause.} \quad \text{spend} \quad \text{Effect.} \\ \text{Line 1 } \left\{ \begin{array}{l} 9^{\text{s}} 8^{\text{m}} \\ 2 \left\{ \begin{array}{l} 24 \\ 16 \end{array} \right\} \end{array} \right. \quad \left\{ \begin{array}{l} 12^{\text{l.}} \\ * \end{array} \right\} \quad \frac{24 \cdot 16 \times 12}{9 \cdot 8} = \frac{24 \cdot 2 \cdot 12}{9} = \frac{24 \cdot 2 \cdot 4}{3} = \\ \text{spend} \quad \quad \quad [8 \times 2 \times 4 = 64^{\text{l.}} \text{ Answer.}] \end{array}$$

EXAMPLE VII. If 8 Men be 6 Days in digging 24 Yards of Earth, how many Men must there be to dig 18 Yards in 3 Days?

$$\begin{array}{l} \text{Cause.} \quad \text{dig} \quad \text{Effect.} \\ \text{Line 1 } \left\{ \begin{array}{l} 8^{\text{m}} 6^{\text{d}} \\ 2 \left\{ \begin{array}{l} * \\ 3 \end{array} \right\} \end{array} \right. \quad \left\{ \begin{array}{l} 24^{\text{y}} \\ 18 \end{array} \right\} \quad \frac{8 \cdot 6 \times 18}{3 \times 24} = \frac{8 \cdot 6 \cdot 6}{24} = \frac{8 \cdot 1 \cdot 6}{4} = 2 \times \\ \text{dig} \quad \quad \quad [6 = 12 \text{ Men. Answer.}] \end{array}$$

EXAMPLE VIII. If there is Stock of Bread in Garrison sufficient to serve 600 Men with 15 Ounces each a Day for 16 Weeks, how much of the *same* Stock will serve each of 500 Men a Day for 24 Weeks?

N. B. Here the *same Stock of Bread* consumed by each Party of Soldiers must be marked by 1.

Line

	<i>Cause.</i>		<i>consume</i>	<i>Eff.</i>	
Line 1	600m 15 ^{oz} 16 ^w	\times	15	600 . 15 . 16	$\times 1 = \frac{6 . 15 . 16}{5 . 24} =$
2	500 *	\times	24	500 . 24	$\times 1 = \frac{1 . 3 . 16}{4} = 3 \times 4 = 12 \text{ oz, Answer.}$
			<i>consume</i>		

EXAMPLE IX. *What Principal, in 8 Months, at 5 per Cent. will gain 20 Pounds?*

	<i>Cause.</i>		<i>gain</i>	<i>Effect.</i>	
Line 1	100 ^l 12 ^m	\times	5	100 . 12	$\times 20 = \frac{100 . 12 . 4}{8} = 100 \times 6$
2	*	\times	8	8	$\times 5 = 8$
			<i>gain</i>		$[= 600\text{l. Answer.}]$

EXAMPLE X. *If the Carriage of 5 Hundred Weight cost 3^l. 7s. 6d. for 150 Miles, what will the Carriage of 7 $\frac{3}{4}$ Hundred Weight cost for 64 Miles?*

	<i>Cause.</i>		<i>cost</i>	<i>Effect.</i>	
Line 1	5 ^h 150 ^m	\times	135 Sixp.	7 $\frac{3}{4}$. 64	$\times 135 = \frac{31 . 64 . 135}{5 . 150} =$
2	7 $\frac{3}{4}$ 64	\times	*	5 . 150	$= \frac{31 . 64 . 135}{5 . 150} =$
			<i>cost</i>		

$$\frac{31 . 64 . 135}{4 . 5 . 150} = \frac{31 . 16 . 135}{5 . 150} = \frac{31 . 16 . 27}{150} = \frac{31 . 16 . 9}{50} = 89$$

Sixpences $\frac{7}{25} = 2\text{l. } 4\text{s. } 7\text{d. } \frac{1}{2}$. Answer.

EXAMPLE X. *If the Carriage of 150 Feet of Wood, weighing 3 Stone a Foot, for 40 Miles, comes to 3^l. how much will the Carriage of 54 Feet of Free-Stone, weighing 8 Stone a Foot, cost for 25 Miles?*

	<i>Cause.</i>		<i>cost</i>	<i>Effect.</i>	
Line 1	150 ^f 3 ^s 40 ^m	\times	3 ^l .	54 . 8 . 25	$\times 3 = \frac{54 . 25 . 3}{150 . 3 . 40} =$
2	54 8 25	\times	*	150 . 3 . 40	$= \frac{54 . 25 . 3}{150 . 3 . 5} =$
			<i>cost</i>		

$$\frac{54 . 5 . 3}{150 . 3} = \frac{54 . 5}{150} = \frac{54}{30} = \frac{18}{10} = 1 \frac{8}{10} = 1\text{l. } 16\text{s. Answer.}$$

EXAMPLE XI. *If 248 Men in 5 $\frac{1}{2}$ Days, of 11 Hours each, dig a Trench of 4 Degrees of Hardness and 232 $\frac{1}{2}$ Yards long, 3 and 2-3ds wide, and 2 $\frac{1}{2}$ deep; in how many Days, of 9 Hours each, can 24 Men (working at the same Rate) dig a Trench of 7 Degrees of Hardness and 337 $\frac{1}{2}$ Yards long, 5 and 3-5ths wide, and 3 $\frac{1}{2}$ deep?*

	<i>Cause.</i>		<i>dig Trench</i>	<i>Effect.</i>	
Line 1	248m $\frac{11\text{d}}{2}$ 11h	\times	4 ^d $\frac{465\text{l. } 11\text{w } 7\text{d}}{2 \quad 3 \quad 3}$		
2	24 *	\times	7 $\frac{675 \quad 28 \quad 7}{2 \quad 5 \quad 2}$		
			<i>dig Trench</i>		

$$\frac{248 . \frac{11}{2} . 11 \times 7 . \frac{675}{2} . \frac{28}{5} . \frac{7}{2}}{24 . 9 \times 4 . \frac{465}{2} . \frac{11}{3} . \frac{7}{3}} = \frac{248 . 11 . 7 . 11 . 675 . 28 . 7 . 2 . 3 . 3}{24 . 9 . 4 . 2 . 2 . 5 . 2 . 465 . 11 . 7}$$

$$= \frac{31 . 11 . 75 . 7 . 7 . 2 . 3 . 3}{3 . 2 . 2 . 5 . 2 . 465} = \frac{31 . 11 . 15 . 7 . 7 . 3}{2 . 2 . 465} = \frac{31 . 11 . 7 . 7 . 3}{2 . 2 . 31}$$

$$= \frac{11 . 7 . 7 . 3}{2 . 2} = \frac{1617}{4} = 404\frac{1}{4} \text{ Days. Answer.}$$

N. B. In the above Question, the *Degree* of the *Men's Strength and Activity* might have been added; which had rendered the Solution still more *prolix* or *complicated*, though not more difficult.

☞ If the Question to be resolved by Proportion be never so much complicated, it may be readily answered by the foregoing Mechanical Rule.

An ACROSTIC. By Mr. OLIVER, of Beamister.

A-rt's living Colours are too faint
 N-ancy's enchanting Face to paint;
 N-o Pen is able to express
 E-ach Virtue that she does possess;
 H-er Motions charm with ev'ry Grace,
 A-ngelic Beauty fires her Face;
 L-ike *Dian* chaste, like *Venus* fair,
 L-ike *Pallas*, Wisdom is her Care.

NEW ÆNIGMAS.

I. ÆNIGMA 209, by the Rev. Thomas Vaughan, M. A. of Morpeth,

LADIES, my Origin and Birth
 I do derive from Mother Earth;
 I'm beautiful — and when I blow
 I make a very splendid Show.
 Sometimes you may at one View see
 Some hundred Acres clad with me,
 A careful and laborious Breed,
 Days after Days on me do feed.
 Men burn me to promote their Gain,
 But after that I live again.
 The *Quality* to me resort;
 I am a *Storehouse* for their Sport.
 Though I am useful to the Dame,
 When old she makes of me a Flame.

II. ÆNIGMA 210, by the same Correspondent.

ORIGINALLY, if you'll trust
 Me, Ladies, I was nought but Dust;
 Until some fam'd Artificer
 Took Pains with me, and did prefer
 Me to the Gentry of this Nation;
 When greatly alter'd was my Station.
 I then was made a Place of Rest
 For many a great and noble Guest:
 Kings, Queens, and Princes, with me dwell,
 Spend their whole Day within my Cell.
 I'm never without Company;
 For when a King with me does die,
 Quickly an *Emperor* does come
 And steps into the dead King's Room;
 Or else some *Duke*, or noble *Lord*,
 Supplies his Place — says ne'er a Word.

Sometimes

Sometimes my *Station* is but low,
Which suits but ill with *Kings* you know.
At other Times I'm set on high,
Which well agrees with *Majesty*.
I'm well respected, in the main,
For Sake of those I do maintain.
Now, *Ladies*, I have rung my Fame,
I beg of you to tell my Name.

III. ÆNIGMV 211, by Mr. Swift, of Stow.
A *Friend* I am found
To all Countries round,
And to the whole World, you may see ;
Yet no Words can express
Of me the *Likeness* ;
Then say what round *Thing* I can be.

IV. ÆNIGMA 212, by Gemini, of Morpeth.
THOUGH crooked I am, do not me abuse,
For frequently I have been found of much Use ;
In *Poetry* I am oft known to have Place,
And *Plays* without me would be found without Grace,
If a *Friend* should enquire for his nearest of Kin,
'Twill be then ten to one but he finds me step in :
And so I well may, as most Men will agree ;
And *Pope*, the fam'd *Poet*, was liken'd to me.
No more I've to say ; should I ask of you,
Fair *Ladies*, my Name, I shall then come in View.

V. ÆNIGMA 213, by Mr. Draper.
YE *Adepts*, who solve quaint *Ænigmas* with Ease,
Make known to the *Ladies* my Name, if you please.
Erect in the *Woodlands* I once did appear,
And thence I to City and Town did repair ;
The Streets of fam'd *London* I've travers'd around,
And with Midnight *Bacchanals* often am found.
To some I am frightful, by Night and by Day,
Who'd always much rather keep out of my Way.
My Aspect oft varies ; — in Grandeur, I shine
With a *Crown* on my Head — and to make me look fine,
Like a modern *Colossus*, I'm slender and tall,
But oft, like a *Pigmy*, my Stature is small.
Like a *Skeleton*, *Ladies*, I look lean and poor,
And oft, like a *Centry*, take Post at a Door.
My Master on Duty I always attend,
Who for Services owns me his very good Friend.
In his Bosom he often permits me to rest,
Where I lie very snug, like a Bird in the Nest.
My Station is various ; I pass here and there ;
With *Jack Ketch* at *Tyburn* I'm known to appear.
To *Brentford* Election with *Tools* I was sent,
Though ordain'd to do Justice, and Mischief prevent.
To *Liberty* I am a Friend and a Foe,
And, like a *Bravado*, to combating go.

THE BRITISH PALLADIUM, or

At an *Assembly august* I've enter'd the Door,
 And many a *Bully* I've laid on the Floor.
 With a heftoring *Bravo* I sometimes appear ;
 At *Paris* am known very well to *Monfieur*.
 In *England* I'm noted, and bear a Command,
 And assert my Prerogative throughout the Land.

VI. ÆNIGMA 214, by Miss Polly Stow, of Stow, near Lincoln.

I HAVE *two* Guards attend my Door,
 A Male and Female (*very poor* !)
 A Female Guard I think you'll say
 Is mighty odd ; — perhaps it may.
Door did I say ? — Yes, I have two ;
An open House I keep for you.
 My Guards stand Centry Night and Day,
 And one is drest up mighty gay :
 And, if the Morning be serene,
 My Female Guard is always seen,
 Adorn'd and bright as any *Queen*.
 Then out she comes — to welcome all,
 Who come to see my open Hall.
 But, if the Weather prove severe,
 Within the *Hall* she waits till clear ;
 Her Male Companion courteously
 Goes out for her then instantly.
 In Weather bad he ne'er stirs out
 Without his *Cloak*, as past all Doubt ;
 And yet, 'tis very odd you'll say,
 He wears a *Cloak* on each hot Day :
 And what's more strange, yet very true,
 When you my Palace come to view,
 He ne'er is seen out Doors to go,
 Except in *Rain, Wind, Frost, or Snow* !
 Say what my *Palace* is — and who
 My Centries are — Attendants too —
 One like a *Conjurer*, and *Watch-joiner*,
 T'other like *Sophy*, a *Springer* and *Liner* !

VII. ENIGME François 215, par Mademoiselle H—y, de l'Île de Wight.

DANS la Maison jamais je n'habite,
 Jamais je ne suis dehors ;
 Chères Demoiselles, regardez bien vite,
 Mon Nom vous trouverez alors.

TRANSLATION.

WITHIN a House I never dwell,
 And never am without ;
 Dear Ladies, you my Name may tell,
 Who keep a sharp Look-out,

Whoever sends the best Answers to the following Ænigma before March next, has a Chance, by Lot, to win 5, 4, and 3 Palladiums.

PRIZE-ÆNIGMA, by Mr. Thomas Sadler, of Whitchurch, Shropshire.

THE Scripture often speaks of me ;
 Read *Exodus*, and you may see

How *Moses*, by divine Command,
Led *Israel* out of *Pharaoh's* Land.

By the good Housewife priz'd am I,
Who forms me with Dexterity.
I am not yet a Fortnight old,
And often wait upon a Scold,
Yet born *Two Thousand Years* ago!
Strange Contradictions! — Even so, —
Upon the *Poor* I'm sure to wait,
But seldom on the *Rich* and *Great*.

Dear *Ladies*, did you ever see
In *Cbina-Shop* a *Toy* like me?
So much admir'd, so neat and round,
In *Farmer's House* where I am found.
No Legs I have, ye *Fair*, to walk,
Nor yet a Tongue wherewith to talk.
Indeed a *Mouth* I have that's wide,
But Hands nor Arms on either Side:
At *Portsmouth* they procure me Food,
To swallow up and do me good.
There *Sophy* moulds me as she please,
And talks me o'er, at catching Fleas;
Poor *Yea-and-Nay*, when *Sophy* loves him,
Speaks of me, as the *Spirit* moves him.
But soon, alas! I undergo
Strange Scenes of miserable Woe!
Burnt at a Stake some Victims are;
Such fiery Racks I'm forc'd to bear!
And, to bemoan my Destiny,
Within a *Whirlpool* I must lie;
Dismember'd there in every Part,
Enough to cause an aching Heart!
But when to me they've done their worst,
I heave and swell as if I'd burst.
When in this Form I do appear,
I'm cover'd up for Fear of Air;
Should I catch Cold, poor *Margery*
Will wring her Hands, perchance, and cry:
But, after all, hard Fate to tell!
Within a *Dungeon* I must dwell;
There I expire, sad woeful Case!
Another soon usurps my Place,

NEW QUERES.

I. QUERE 214, by Mr. Thomas Atkinson, of Ingham.
WHERE was *Harold*, the second *Danish* King, buried?

II. QUERE 215, by Mr. Alexander Rowe.

*Quo Tempore, et quo Auctore, Nomina, quibus nunc utimur, Diebus Septimanae
indita sunt?*

III. QUERE 216, by Mr. George Newland, of Mr. Nicholson's School, at Newport, in the Isle of White.

HOW must 4 Pullies be combined, to raise the greatest Weight with the same Power?

IV. QUERE 217, par Mr. Rowe, de Cornwall.

TROUVER les Dimensions du moindre Cone circonscrivant une Spère de $2\frac{1}{2}$ Piés de Diamètre.

V. QUERE 218, by Historicus.

AT a Place called Catsgrove, near Reading, in Berks, is to be seen a natural Curiosity, not noticed by Camden in his Description of that County: Where are different Strata of Earth, and, among the Rest, Beds of Sea-Sand; from which the Workmen, belonging to a Limekiln on the Spot, dig up perfect Oysters, firm and unopened, and shew them to Travellers. Without recurring to that general Sea, for all Difficulties of this Sort, Noah's Flood, it is required to be known, if the Spot, whereon the Town stands, was ever recorded in History to have been overflowed by the Sea, from an Earthquake, or any other Cause.

VI. QUERE 219, by Grammaticus.

THE Word Rest (meaning the remaining or Remainder) is set down in Dr. Johnson's Dictionary both as a Substantive and as an Adjective. It will not stand the Test of an Adjective, because it will not be coupled with a known Substantive (such as Things) and make Sense by such a Conjunction, the rest Things being Nonsense: And it scarce appears to be a Substantive for these Reasons; 1. because some Substantive seems understood to belong to it, which is not named; 2. as it cannot be used in the singular Number, (as equivalent to Remainder, a known Substantive), the Rest is being a Solecism; and lastly, as there would then be no Word that exactly corresponds with the Latin Word reliquus or reliqui. Quere, then, whether it be a Substantive or an Adjective? or sometimes one and sometimes the other?

VII. QUERE 220, by the same Correspondent.

BISHOP Lowth, among other of his ingenious and critical Remarks on English Solecisms, animadverts on the following Expression — Who do you think me to be? — and condemns it for a Fault. He will have us say, Whom do you think me to be? Now, the Question is, whether in this we are to follow the Analogy of the Latin and Greek Languages, which agree in putting the same Case before as after the Infinitive Mood; — as, Quem credis me esse? or whether we are to examine the Merits of the Case by a Transposition; which is a good Method of Explanation, and presents us with this seemingly uncouth Expression, Do you think me to be whom? In a Word, whether the Apposition of Cases ought here to predominate over that known Rule, that Neuter Verbs require a Nominative Case after them?

MR. Alexander Rowe proposes a Quere, (from the Philosophical Transactions, Vol. lvi. for 1766, P. 219.) that as the Variation of the Magnetic Needle in the West-Indies was found to be less when the Ship is at Anchor, or near Shore, than when at Sea; and observes that doubtless the same Phenomenon may be found in other Places; he would have a probable Cause or Causes assigned for this Variation of Variation, — But this is like proposing Questions concerning the Essence of Matter, or cogitative Substance, whereof we have no Ideas; and consequently can have no real Knowledge therein. Experience of what is produced from material or cogitative Causes, is our only Instrument of real Knowledge,

ledge, till our *Faculties* are enlarged and improved. In Respect of present Experience only, we know *Things* no farther than as they appear through the *Mediums* of *five Ways* of Perception, in our present State of Existence. When our *Faculties* are enlarged, or altered, our present Knowledge will become Ignorance; and we shall then see and know *Things* under quite different Modes of Perception. So that we need not *distract* ourselves about carrying our Knowledge, in our present State of Existence, to the utmost Extent, beyond what is necessary to know for our present and future Happiness; since our present Knowledge (beyond true Religion and Morality) can be of no Use to us, after a short Space, when this Mode of Existence is put off, and we shall be fitted with entirely new, or vastly extended, *Faculties*. This, the strong Hopes of another Life, and the Preparation for it in the present, induce us (from Reason and Religion) to believe; as *Beings* of superior *Faculties* to all others about us. For, as in the Scale of Gradation of *Beings* below us, those of the inferior Order are seen to change their present State, by dying, (but to what new Modes of Life, or how, we at present know not), so *Man*, placed in the Scale of his present State, between his next inferior *Being* and the Supreme Creator, changing this State, and dying in common with the Rest of his *Fellow-Animals*, is led by Hope, and the Changes that he sees, that are likely to happen even in *Systems* of great *Bodies* carrying other Inhabitants, about us, (all tending, by their revolving *Laws*, to a general Dissolution), to conclude from thence, as well as from Revelation, that his State of Being will be renovated in a greater Degree of Excellence; and so, by Rotation, throughout the Orders of Being in every World, approaching, by different Degrees of Change and Preeminence, towards the Perfections of the most High and Incomprehensible Creator!

NEW REBUSES.

I. REBUS, by Mr. W. Swift, of Stow.

FIVE-NINTHS of a Place, where the Harlots feel Pain,
Will shew you what Virgins would be or obtain.

II. REBUS, by the same Correspondent.

OF three ever-green Trees if th' *Initials* you join,
The Name of my favourite Fair* will define.

* Miss Polly Stow's Rival.

III. REBUS, by Gemini, of Morpeth.

WHAT many rue taking when 'tis found too late,
What makes us quite easy in every State;
These *Initials* to that which a 'Squire may ascend to,
When join'd will produce what *less* have than pretend to.

IV. REBUS, by Mr. W. Oliver, of Beamister.

THE Reverse of an Ornament, worn on a Hat,
Will give you the Name of a Town very pat.

V. REBUS, by the same Correspondent.

AN Insect remark'd for Industry by all,
A Dress in which Ladies oft go to a Ball,
A Member that often resolves you a Doubt,
And the God that presides over Health next find out;
Connect their *Initials*, which is not very hard,
And you'll find out a Friend whom I greatly regard.

VI. REBUS

THE BRITISH PALLADIUM, or

VI. REBUS, by the same Correspondent.

WITH what for Fifty often stands
A Female Sheep unite ;
One-third of all the liquid Plain
Then next in Order write ;
You'll see a Town, where Worth does dwell,
A lovely Maid ! — The Place pray tell.

VII. REBUS, by Mr. Thomas Sadler.

A Name given William, and Half of a Shilling,
Three-fifths of a Stone you may add if you're willing ;
The Name of a Fair-one from hence will appear,
Who had twenty Sweethearts — to woo her last Year.

✍ For Mr. Swift's Well-wishes to the Palladium-Author, on his declaring himself to be no longer a Correspondent, that Author wishes, in Return, that he may keep his Word.

NEW PARADOXES.

I. PARADOX, by Mr. Oliver, of Beamister,
MY Father died, I'll make appear,
Before that I was born, ten Year ;
Yet he is now alive and well ;
How this can be, be pleas'd to tell.

II. PARADOX, by Mr. George Newland, of Mr. Nicholson's Mathematical School, of Newport, in the Isle of Wight.
A Pound of Feathers weighed more in one Bag than in another, though both Bags were of equal Weight.

NEW QUESTIONS.

I. QUESTION 423, by Mr. William Pen, of Chalfont.
IF I buy 120 Eggs at 2 for a Penny, how many must I buy at 3 for a Penny, so that, selling them out together 5 for 2 Pence, I may gain exactly 19l. per Cent. by the Bargain ?

II. QUESTION 424, by Mr. William Oliver, of Beamister.
IF 650l. be put out at 5l. per Cent. simple Interest, and 580l. at $4\frac{1}{2}$ per Cent. compound Interest, in what Time will the Difference of their Amounts be equal to 600l. ?

III. QUESTION 425, by Mr. John Lupton, at Mr. Townshend's Academy, at Doncaster.
IF 40 Posts of Oak and 100 Rails be one Load ; how many Loads will 2900 Rails and 700 Posts make ?

IV. QUESTION 426, by the same Correspondent.
THE Length of a Hall-Floor is 8.476 Yards, the Breadth thereof 6.472 Yards. how many Bricks will it take to pave the same, of 9 Inches long by $4\frac{1}{2}$ broad ?

V. QUESTION

V. QUESTION 427, by Mr. William Wells, of Crowle, Leicestershire.

ON a certain Day of the Year, since 1750, the Number of Years I had then lived being multiplied by 51, the *Product* was equal to the *Date* of the Year in which I was born. Required, from thence, my Age in this present Year 1771.

VI. QUESTION 428, by Mr. Thomas Adcock, of Ashby de la Zouch,

YE Adept^s, two fair Maidens Ages find,

From these Equations here below* defin'd.

$$\frac{x + x^2y + 12}{\sqrt{xy + 56}} = 2421; \quad x^2 + y^2 + 100 = 6936. \quad \text{Quere } x \text{ and } y \text{ their Ages?}$$

VII. QUESTION 429, by Mr. Dalton, of Pool.

THERE is a *Vein* of Coal whose Length is 50 Feet, Depth 5, and Content, in Tons, equal to the Cube of its Breadth multiplied by $237\frac{1}{2}$ Feet. Required the Worth of the *Vein* when the Coals are sold at 5s. per Ton. Also to give a general Rule for finding the Content of any Piece of Coal, in Tons, when the Length, Breadth, and Depth, are given. Designed for the Information of such Gentlemen's Stewards, as are apt to mistake in this Sort of Calculations.

VIII. QUESTION 430, by Mr. William Wells, of Crowle.

HAVING purchased a rectangular Piece of Ground, conditionally, for which I am to pay at the Rate of 3l. for every Chain in Length, and 4l. for every Chain in Breadth: How much Land is the most I can purchase for 100 Guineas?

IX. QUESTION 431, by Mr. William Hardy, of Cottingham, near Hull.

THE three Distances from a Point, without a geometrical Square, to the next 3 contiguous angular Points, in successive Order, are given = a , b , and c , respectively, (b being the Middle Distance to the nearest rectangular Point, and a and b the Distances to the Left and Right-Hand angular Points). Required, from thence, the Side of that Square, by a general Rule.

X. QUESTION 432, by Mr. Robinson, of Biddick.

THERE is a Square, and a Cube, such, that the Area of the Square is equal to twice the Solidity of the Cube; and the Difference of their Diagonals is the least Quantity possible. Required their respective Dimensions.

XI. QUESTION 433, by the same Correspondent.

$$\left. \begin{array}{l} x^3y^3 + xy = b = 3480. \\ x^3 + y^3 + x^2y + xy^2 = c = 6028. \end{array} \right\} \begin{array}{l} \text{Required the Values of } x \text{ and } y, \text{ by a short} \\ \text{and easy Method.} \end{array}$$

XII. QUESTION 434, by Miss Polly Stow.

DEAR, good, Mr. Swift, } * Find the Content of 2 Globes, each equal to
Pray give me a Lift; } 6 Inches Circumference, (without using Dia-
As you from the Wars, } meter or Radius) and also the Solidity of the
Are come without Scars. } greatest Cylinder, of 9 Inches Altitude, that can
be inscribed in a Conoid, whose Transverse and Conjugate Diameters are as 10 to 5.

XIII. QUESTION 435, by Mr. Robinson, of Biddick.

$$\left. \begin{array}{l} \text{YE Artists impart,} \\ \text{By a Method of Art,} \\ \text{The Values of } x, y, \text{ in View,*} \\ \text{From a simple Equation,} \\ \text{(No other Relation)} \\ \text{And I will as much do for you,} \end{array} \right\} \begin{array}{l} \frac{\sqrt[3]{y^2} + \sqrt{x^3}}{\sqrt{x}} = x + 1. \\ \frac{\sqrt{9x^3 - 2y^2}}{3y} = \sqrt{x}. \end{array}$$

XIV. QUESTION

XIV. QUESTION 436, by Mr. Robinson, of Biddicle.

ON a certain Day of the Year, in the Summer-Quarter, 1770, the Sun's Altitude, at 6 o'Clock in the Morning, was $17^{\circ} 4' 15''$, and the Meridian Altitude, that Day, 56° . Required the Latitude of the Place North, and the Day of the Month, where and when this Observation was made.

XV. QUESTION 437, by Mr. William Oliver, of Beamister.

IF a Company of Soldiers, consisting of 99 Men, was drawn up in 3 Ranks, at 40 Feet Distance from each other, and each Soldier take up 3 Feet of Ground: Required the Place where the TIMIST ought to be situated, so that every Man may see him, and that the 3 Ranks may appear to him in a right Line, in Perspective.

XVI. QUESTION 438, by the same Correspondent.

REQUIRED the Diameters of 6 equal Cannon-Balls, the largest that can be contained in a Bomb-Shell, whose concave Diameter is equal to 20 Inches. Also the Diameters of 6 other Balls, each of which shall touch 3 of the former Balls, and the internal Surface of the Shell.

XVII. QUESTION 439, by Mr. Atkinson, of Ingham, Lincolnshire.

HOW high in the Air must a Person be raised from the Earth's Surface, in Latitude 53° North, to see the South-Pole, or a Star in the Place thereof?

XVIII. QUESTION 440, by Mr. Jonathan France, Mathematical Master, at Hope, Derbyshire.

THE Content of an oblong Cistern = 99 Feet, is to be sold for every Foot of its Length at 1s. for every Foot of its Breadth at 2s. and for every Foot of its Depth at 3s. Required to give its Dimensions in Length, Breadth, and Depth, so as to sell it for the most Money, and what will be the Value thereof.

XIX. QUESTION 441, by Mr. William Hardy, of Cottingham.

TO delineate, in Plano, an elliptical Dish-Cover, whose Transverse is 16, Conjugate 12, and Height 6 Inches. To be done in 1 Piece and with 1 Seam.

The above Question is useful to the Tin-plate Workers and Braziers, who have often Occasion to turn elliptical Cones and Frustums: Who have no other Way than by first turning them conical, and then putting them in their proper Forms, clipping them even at the Bottom and Tops of the Frustums.

XX. QUESTION 442, by Mr. Alexander Rowe, of Reginnit, Cornwall.

TO find the Area of the exponential Curve, whose Equation is,

$$\frac{y}{x} = a^{3x}$$

XXI. QUESTION 443, by Mr. Stephen Hartley, of Sowerby-Bridge.

IF the Hypotenuse of a right-angled Triangle be equal to twice the Sine of the greater acute Angle, the Sum of the Legs will be equal to the Square of the greater Leg; and their Difference equal to the Square of the lesser Leg. Required the Demonstration thereof.

XXII. QUESTION 444, by Mr. L. Nicholson, Land-Surveyor and Master of the Mathematical School at Newport, in the Isle of White.

IN what Time must the Earth make one Revolution round its Axis, that Corisbrook Castle (Latitude $50^{\circ} 40'$) may begin to tumble upwards?

XXIII. QUESTION

XXIII. QUESTION 445, by Mr. George Newland, Pupil to the above Mr. L. Nicholson, at his School in the Isle of Wight.

REQUIRED the Depth of the famous Well, at Carisbrook Castle, a Pin being let fall into which, was heard to strike the Water in 3 Seconds, and $\frac{1}{2}$ of a Second of Time, after delivering it from the Hand, at the Top of the Well.

XXIV. QUESTION 446, by Mr. Roberts, of Greasborough, near Rotherham.

NEAR Borough Bridge, in Yorkshire, stand 3 large Obelisks, called the Devil's Arrows; each is 30 Feet high, 12 Feet broad, and 8 Feet thick; and supposed to be as much beneath, as they are above, the Earth's Surface. They are placed at A, B, C; successively, in a circular Arch, less than a Semi-Circle; the Distance (or Chord) AB, being 360 Feet 4 Inches, BC 199 Feet 9 Inches, and a Perpendicular, AD, being let fall from A, upon the Chord CB continued; that Perpendicular will be 15 Feet 8 Inches. Required, from thence, the Circle's Diameter, on whose Circumference these 3 Devil's Arrows are erected.

XXV. QUESTION 447, by Mr. George Hicks, of Reedness Free-School.

REQUIRED the ~~great~~ inscribed Square that can be drawn in an Ellipsis, whose Transverse Diameter is = 50, and Periphery = 141.3957 Inches, without the Help of Conic Sections.

XXVI. QUESTION 448, by Mr. Atkinson, of Ingham, Lincolnshire.

IF a perfect Steel Rod, of a conical Form, whose Diameter at Base is Half an Inch, and Altitude 3 Feet; be let fall, or put in Motion, at a certain Distance from the Earth's Surface, with its Vertex directly downwards, and descend by the Force of its own Gravity, after the Manner of any other falling Body, so that it may just arrive at the Earth's Surface, when its Vertex shall be directly upwards: Required the Time of its being in Motion, and the Height, above the Earth's Surface, from whence this Rod must be let fall.

Whoever answers the following Question properly by March the 1st next, has a Chance, by Lot, to win 12 Palladiums.

PRIZE-QUESTION, by Mr. Atkinson, of Ingham, Lincolnshire.

A Gentleman, at the Age of 37, sells a Freehold-Estate of 150l. a Year, as follows. The Purchaser to pay a certain Sum yearly to the Seller, during his Life; and, after his Decease, an Annuity to his Wife (whose Age is now 32 Years) during her Life. Required, upon an Equality of Chance, the yearly Sum the Buyer shall pay to the Seller, when the Interest of Money to both Parties is reckoned at 4 per Cent. per Annum.

Not having received any Contributions this Year from Captain Williams, of the Royal Artillery of Woolwich, we must wait the favourable Opportunity, till he returns from abroad, before we can oblige our Correspondents with his able Productions.

Of the PROPER ENGLISH SOUND of the VOWEL A, according to Dr. Johnson: See his Dictionary. Communicated by Mr. L. Nicholson, Master of Newport School in the Isle of Wight. Addressed to TEACHERS of the English Language.

A has three Sounds, the slender, open, and broad.

A slender is found in most Words, as Face, Mane; and in Words ending in ation, as Creation, Salvation, Generation. [Why then will some Teachers of Schools call A by, and give it the broad Sound, in general, contrary to the general Rule or Sound that A has obtained among the Learned? for the Rabble are no Authority for the Propriety of Speech.] The A slender is the proper English A, called by Erpenius, in his Arabic Grammar, A Anglicum cum E mistum; as having a Middle Sound between the open A and the E. The French have a similar Sound to the English A, in the Word Pays, and in their E Masculine.

A open is the A of the Italian, or nearly resembles it; as sounded in Father, rather, congratulate, Fancy, Glass.

A broad resembles the *A* of the German, as sounded in *all*, *Wall*, *Call*. Many Words, pronounced with *A* broad, were anciently written with *au*, as *Fault*, *Mault*; and we still say *Fault*, *Vault*. This was probably the Saxon Sound; for it is yet retained in the Northern Dialects, and in the rustic Pronunciation, as *Maun* for *Man*, *Haund* for *Hand*.

The short *A* approaches to the *A* open, as sounded in *Grass*.

The long *A*, if prolonged by *E* at the End of the Word, is always slender, as sounded in *graze*, *Fame*. JOHNSON.

REMARK. By LITERARIUS.

IT is a Matter of no small Concern to instruct and ground young Beginners, at School, in the proper Pronunciation of the Letter *A*, as well as in the proper Names and Sounds of all Letters and Syllables, while the Organs of Speech are flexible. For, by these Means, Youth at School will learn to read sooner, and will not be confounded by the various Pronunciation and different Names of the same Letters, as taught by the Masters of Schools, in different Counties, according to this or that particular provincial Dialect.

By a Standard, or general Custom of Pronunciation of the same Letters, Syllables, and Words, taught as nearly alike as possible, the Way to Improvement will be smooth and easy, and not confused: Whereas the Sound of the same Letters, Syllables, and Words, is now taught variously in different Counties, from unsettled Example; while the Standard Example should be derived from the best Schools and Authority.

In reading English, Youth should be instructed in proper Quantity, Accent, Emphasis, Cadence, and Pause, for acquiring a graceful Delivery. Whoever is ignorant of these Matters, or retains a provincial Pronunciation, should not presume to teach; or, if he did, should be rejected, by sufficient Judges, as an Enemy to Improvement.

Some Teachers of the English Tongue, instead of instructing their Scholars to call the Letters by the same Names, teach their very Names different; and thereby occasion a Confusion in speaking of the Division of English Words into Syllables, among Youth, or others, educated at different provincial Schools.

Some Teachers of English, instead of teaching their Scholars the first Principles of Language, according to the general Custom, and to call the Name of the Letter *A* as it is generally called and sounded (in *Name*, *Fame*, &c.) teach them to call it, after its Exception or broad Sound, by the Name of *au*, as the Scotch, Germans, French, Spaniards, &c. call it; whose Customs are no Patterns for naming and sounding the English Letters and Language.

These English Teachers, with the same Impropriety, (contrary to the general Custom of the best Schools), might as well miscall the Names and Sound of the other two Vowels, viz. *E*, *A*; and *I*, *E*; as the Scotch, Germans, French, &c. call and sound those Letters; as to call *A*, *au*, in particular, as Foreigners call it, because we sometimes sound it broad, as in *Water*, *Salt*, *Call*, &c.

Some provincial Teachers call *K*, *kau*, as well as *A*, *au*; and sound those Letters in Syllables and Words accordingly. As they pronounce *cau*; whence *Cake* must be sounded *Cauke*: *Ba*, *bau*, whence *bake* must be pronounced *bauke*; *Candle*, *Caundle*; *Bramble*, *Braumble*; *Caper*, *Cauper*; *Cato*, *Cauto*; were they right. And the same Mis-sound of Syllables will follow (as from calling *a*, *au*) in *da*, *fa*, *ga*, *ka*, *la*, *ma*, *na*, *pa*, *ra*, *sa*, *ta*, *va*, *wa*, *xa*; as well as in placing an *A* before Consonants, (*ab*, *ad*, *af*, *ag*, *ah*, *ak*, &c.) if the calling and sounding *A*, *au*, in general, were customary.

For *David* would be *Dauvid*; *Abram*, *Aubraubaum*, (as some provincial Teachers sound the latter); *fatal* would be *fautal*; *Gate*, *Gaute*; *Hate*, *Haute*; *Navy*, *Nauvy*; *Adam*, *Audam*; *affable*, *aufable*, &c. perverting the customary Sound or Propriety of the English Speech, by making it border on the Sound of the Scotch, German, French, &c. Languages,

Hence,

Hence, the *Absurdity* of teaching *English* according to the *naming* and *founding* the *English* *A*, *au* ; *K*, *kau*, &c. like the *French* or *Scotch* *Pronunciation*.

So, likewise, if *i* be called *e*, as the *French* call it, then *Time* will be sounded *Teme* ; *Titbe*, *Tetbe* ; *Tiule*, *Tetle*, &c. confounding the *English* Language to imitate the *Scotch*, &c.

The *Ignorance* of some *Parents* appears from hence, who teach their *Children* to read and write *English*, (to save the *Expence* of a *Teacher* when a fit one can be had), not understanding the *Propriety* of speaking and writing *English* themselves.

Some teach their *Children* to sound *Father*, *Faither* instead of *Fabther* ; one as spelt, for *won* ; *o-ther*, as spelt, for *utber* ; *Absurdity*, *Ab-sure-dity* for *Ab-surdity*. *Academy*, *Academmy* for *Acaddemy* ; *negative*, *nega-tive* for *neggative*, &c. mispronouncing or misaccenting most *Words* of three or four *Syllables*, and many of two *Syllables* ; not having been taught right themselves.

Of pronouncing *LATIN* and *GREEK*.

THE *Propriety* of Sound in pronouncing the original *Latin* and *Greek* Tongues, is judged, by most of the *Learned*, to be very defective in most *Words*, and in some to be entirely lost.

But, in pronouncing and speaking *Latin* and *Greek*, it is observable, that every *Nation* pronounces or speaks those Languages according to the modern *Mode* of their own *Mother-Tongue* ; whereby a various *Pronunciation* of *Latin* and *Greek*, among the *Learned* of different *Nations* is used ; while all *Nations* agree in writing them the same ; because, as *dead Languages*, they have but one *Pattern* for *Imitation*.

Whether *Cæsar* and *Cicero* were originally called *Kæsar* and *Kikero*, from the *Greek* *Kappa*, after the *Manner* of that Language, (from whence the *Latin* was partly derived) is not held a *Doubt* by some. And whether many other *Latin* *Words*, containing the *c*, or the *g*, were not originally pronounced as if a *Greek* *Kappa* or *Gamma* were in their Place, is no *Doubt* with others.

The Ship *Niger*, in the *British* Royal Navy, is by some called *Nijur*, and by some *Nigur* ; but, as it is probable the *Greek* *Gamma* took Place in the original *Pronunciation*, it will, and ought to be sounded *Nigur*. For *Tiger* might as properly be called *Tijur* ; or *Nicholas* (with the *Greek* *Chi*) *Nitch-olas* instead of *Nikolas*. - Also *Tigris*, by such *Mode*, might be called *Tijeris*, *Negro*, *Nejero*, &c. with as much Reason, if we are permitted to change the Sound of the *Greek* *Gamma* to that of the *English* *Jay*.

From the Sound of many *Latin* *Words*, pronounced according to the *English* *Mode*, the proper Name and Sound of the *English* Vowel *A* (controverted among Teachers) may be truly defined.

For, if you refer to the reading of the *Latin* Classics, as they are read in both our *Universities*, and in the first or most noted public *Schools* in *London*, and other distinguished *Seminaries* in *South-Britain*, the Name of *A* will be settled at once at *A* common (as it is sounded in *Name*), not *au* (as in *Halt*). Its short Sound as in *Hat*, and broad, as in *Chalk*, (which some ignorantly call *Chal-k*, with all the Letters sounded), or *Chauk*, are the *Exceptions* to the general Sound.

To get rid of the Confusion that the *English* Teachers have occasioned, by calling the Letter *A*, *au*, and sounding *ca*, *cau*, &c. they have (shrewdly as they think) rejected teaching their Scholars the first Rudiments of the *Spelling-Book*, where all the Vowels are placed before and after the successive Order of Consonants ; some having advanced, for their Reason, that *ab*, *ac*, &c. *ba*, *ca*, &c. are put into *Spelling-Books* merely for the Bookseller's Purpose of filling up.

Thus Youth are detained at School for a considerable Time, without being able (if ever) to spell Words, and divide their Syllables properly ; merely by the provincial Obsinacy of Teachers, who will not be put out of the Track of Teaching into which they have been blindly led. Who urge in their Defence,

for this Neglect, that Reading in general will give them the right Pronunciation and Way of Spelling, in Time: The other Method of teaching to spell (according to former Custom) they call a dry and unprofitable Task.

The old Plans of speedily teaching Youth to spell and read, by founding one Consonant with one Vowel, and dividing Syllables of Words, so as to write with Propriety by frequent and diligent Practice, as also for teaching Latin by speaking it, are laid aside for novel Schemes of getting Money by numerous Boarders, paying different Entrance Money, with Expence on numerous Articles: Or among Day-Scholars, by keeping them long in Hand, contrary to honourable and antient Custom.

LITERARIUS.

Concerning Mr. TOBIAS MAYER's last Solar and Lunar TABLES, (for which the Nation paid 3000*l*.) some Time published. Sold by the Booksellers and Mathematical Instrument-Makers, London.

THESE TABLES (so long promised and looked for and come shortly at last) are the same Kind of Refinement upon Mayer's former Tables, as spheroidal is upon spherical Navigation; and are about as much superior in Use and Advantage to the Calculator, as spheroidal Navigation is above the Use and Advantage to the Navigator of sailing by the Sphere.

As in spheroidal Navigation there are refined Corrections of no Consequence, among the unavoidable large Errors in the Course and Distance, so in Hair-splitting Astronomy (according to Dr. Halley's Phrase) there are imaginary small Quantities (the Effect of an astronomical Delirium) introduced into the Hair-brained Computation, of no Certainty; or, if certain, could bear no Proportion to the larger Quantities of Error they pretend to correct in the mean Motions; which can never be corrected by large Equations and Quantities, at all Times, in every Part of the widely-variable Moon's Orbit. And even in the Earth's Orbit, there are, at certain Times, such Deviations, by the joint Actions of the Sun, Moon, and other Bodies, affecting it, as can come under no such correct Computation, as is pretended by those who aim (by an astronomical Ostentation) at an Exactness, to which they never can arrive.

That, as in reckoning the Ship's Way by the common Rules, the Navigator must deviate from Truth, by an Error of some Magnitude, in the Course and Distance, which he can only rectify within a doubtful (seldom certain) Degree of Nearness, by plain and common Methods, (without the minute Correction from lunar Observations), so in the new Practice of observing the Longitude, by comparing the Observations with the Calculations, in the Nautical Ephemeris, from uncertain lunar Tables, there will ever subsist such ample Errors, from the Reduplication of mean Motion, that the larger Equations can only reduce them to an uncertain Nearness. Whence there is no Dependence on minute and insensible Quantities and Equations, in Respect of large Errors, in astronomical Computation. And what is pretended from Mayer's numerous small Equation Tables is vain and fruitless, similar to Clairaut's imaginary Trifles and Redundancies, not worth the Computer's Trouble and Attention.

The Expence of these Tables, by printing Precepts and other Matters in Latin, for which the English Reader had no Occasion, is so augmented, instead of abridging them into a small and more useful Compass, that such Persons as most understand their Use, are discouraged from buying and trying them.

The mean Motion of the Sun for 100 Julian Years is given (besides Revolutions) 41' 23"; that of the Sun's Apogee for the same Time 1° 50', above all the Quantities at which they were ever before stated. The Precession of the Equinox in 100 Years indeed is stated at 1° 23' 50", or at 50.3" a Year, which seems to agree with the present and former Motions. The Decrease of the Obliquity of the Ecliptic is stated at 46" in 100 Julian Years; a Matter of Doubt,

Doubt. As to the 4 *minute Equations* of the *Earth's Orbit* from the \mathcal{D} , \mathcal{U} , \mathcal{Q} , and \mathcal{O} , are as much to be depended on as the *Sun's real Distance* from the *Earth*, and the present esteemed *solar Parallax*.

But a most glaring and actual Absurdity, seen to come out of the *Reviser* of these *Tables Hands*, is (as before has been often noticed in the *Royal Astronomer and Navigator*) the *Epochs* printed for 0, 100, 200, 300, 400, Years before *Christ*, (both in the mean solar and lunar Places or Longitudes), which should be for 1, 101, 201, 301, 401, to correspond with Truth; which Mr. *Maskeelyne* ought to have known as an *Astronomer Royal*. For, from the *Beginning* of the Year 100 since *Christ*, to the *Beginning* of the Years 1, 101, 201, 301, 401, before *Christ*, are 100, 200, 300, 400, complete Years respectively. Therefore the *Epochs*, printed as they are, must lead the *Computer* into *Error*, by using the *Beginning* of the 100, 200, &c. Years before *Christ*, instead of 101, 102, &c. For Mr. *Maskeelyne* might be modestly asked the Number of Years from 0 to 100, 200, &c. before *Christ*. Mr. *Mayer's* greatest *Equation* of the *Earth's Orbit* is now given $1^{\circ} 55' 31''.6$, not sensibly different from his former. — There are *necessary* and *useful Tables*: But the *small lunar Equations* are not to be depended on, and can only agree with the *present Period*. The *Moon's* mean Motion for 100 *Julian Years* (besides *Revolutions*) $10^{\circ} 7' 53' 35''$, *Apogee* $3^{\circ} 19' 11' 15''$, \mathcal{O} *ret.* $4^{\circ} 14' 11' 15''$. — The *Quantities* for the *Moon's Acceleration*, for former and future *Periods*, are doubtful.

OBJECTIONS against observing the Eclipses of Jupiter, at Sea, answered.

AS to the *Ship's Motion* at Sea being magnified by the *Telescope*, so as to prevent observing the *Eclipses* of *Jupiter*, (according to a certain *Mathematical Instrument Maker's Opinion*) holds equally against all *Methods* of observing, whether with *Hadley's Quadrant*, or any *Way* else; except they use no *telescopic Sights*; and then there could be no *Accuracy* in their *Observations*.

The *best Way* to observe one of these *Eclipses* is, by a short *reflecting Telescope*, that magnifies not above 36 or 40 *Times*; or 30 *Times* may do. There is no *Occasion* for any great magnifying *Power*. And it is not doubted, by *Persons* of *Judgement*, but *Irwin's Chair* would be very advantageous for this *End*; which has been thrown aside to serve some *snifter Views*.

NEWTONIENSIS.

QUESTIONS proposed and answered at the End of the NAUTICAL EPHEMERIS, 1771. To be otherwise resolved.

QUESTION I. Being at Sea, in Latitude $47^{\circ} 19' N.$ by Account, when the *Sun's Declination* was $12^{\circ} 16' N.$ at $10^h 24^m A. M.$ per Watch, [i. e. by the Watch] *Sun's Altitude* was found $49^{\circ} 9'$ and at $1^h 14^m$ per Watch [ut ante], his *Altitude* was found $51^{\circ} 39'$. Required the true Latitude. — Determined to be $47^{\circ} 20' N.$ by the *Amsterdam Method* (like Dr. *Rock's* infallible *Jesuit's Drops*) inserted in the *Naut. Eph.* for 1771, with wonderful Sagacity and Judgement.

To find the true Answer, according to the genuine and direct Method of Solution, shewn by Mr. *Emerson* in his *Astronomy*: Exemplified by Mr. *Coughron* in this *Palladium*, P. 41, 42.

N. B. In P. 66, *Naut. Eph.* 1771, it is observed, that the Latitude by the *Amsterdam-Method*, $47^{\circ} 20' N.$ may be relied on, (though founded on a Fiction) because it differs only 1 *Minute* from the Latitude by Account.

QUESTION II. Being at Sea in $50^{\circ} 40' N. Lat.$ by Account, when the *Sun's Declination* was $20^{\circ} 0' S.$ at $2^h 17^m A. M.$ per Watch, it was found $19^{\circ} 41'$. Required the Latitude. — Determined, by the ut ante Method, to be $50^{\circ} 0'$; the Resolver recommending a *Repetatur*, because it differs $20'$, viz. $19'$ more than by the former Answer, from the fictitious Latitude by Account.

QUESTION

QUESTION III. *Being at Sea, in Lat. $60^{\circ} 0'$ N. by Account, when the Sun was in the Equator, and consequently had no Declination, at $1^{\text{h}} 0^{\text{m}}$ P. M. per Watch, his Altitude was $28^{\circ} 53'$, and at $3^{\text{h}} 0^{\text{m}}$ P. M. per Watch [ambo ut ante] it was $20^{\circ} 42'$. Required the true Latitude [from the fictitious one given.] — Determined to be $60^{\circ} 0'$; which coming out the same as the fictitious Latitude by Account, must therefore (the reverend Concluder says) be right. *Que- re, Whether the fictitious Latitude be here adapted to the determined one?**

The reverend Conductor of these Arcana recommends taking the Sun's Bearing or Azimuth, at the first Observation, and the Distance sailed since, to be added to the first observed Altitude, if the Ship has sailed towards the observed Azimuth, or subtracted therefrom if she has sailed from it, during the Interval; to reduce the 1st Altitude to what it would have been if observed at the second Station, when the second Altitude was taken.

He supposes, the Sun bearing S.E. $\frac{1}{2}$ E. by Compass, his Altitude observed $18^{\circ} 27'$, and 3 Hours after it was observed $38^{\circ} 23'$, the Ship in the mean-Time having sailed S.E. $\frac{1}{2}$ E. at the Rate of 6 Knots an Hour. Required the first Altitude, if it had been observed at the same Station where the second Altitude was observed.

Here, the Ship's Course being directly towards the Point of the Horizon of the observed Azimuth, at the first Altitude taken, the Distance run, 18 Miles or Minutes, must be added to the first Altitude, to reduce it to what it would have been seen if observed where the second Altitude was taken. — Whence the two Altitudes for finding the Latitude from the second Station will be $18^{\circ} 45'$ and $38^{\circ} 23'$.

But, if the Ship's Course had been N.W. $\frac{1}{2}$ W. from the Point of the Horizon, the Sun's Azimuth here at the first Observation, in that Case $18'$ must have been subtracted from the first observed Altitude, to use with the second, to find the Latitude at the second Station.

N. B. When the Ship's Course makes an acute or obtuse Angle with the Sun's Bearing, the Distance sailed towards or from that Point of Horizon, at the second Station, may be found from the Table of Difference of Latitude and Departure, says the reverend Author.

He supposes, if the Sun bore S.E. by S. with Altitude $26^{\circ} 50'$, and after 18 Miles Distance run on a South Course, the Sun's Altitude was $37^{\circ} 10'$. Required the first Altitude of the Sun seen at the second Station.

Here the Angle of the Course $33^{\circ} 45'$, and $18'$ Distance, give $15'$ Dif. Lat. to be added to the 1st Altitude, (the Ship having gone so much towards the Sun's Bearing), making it $27^{\circ} 5'$, and $37^{\circ} 10'$, at the 2d Observation. — But had the Ship's Course (he says) been North, or 3 Points from the Point opposite to the Sun's Bearing, $15'$ must have been subtracted, making it $26^{\circ} 25'$ for the 1st Altitude at the 2d Observation.

N. B. When the Ship's Course makes right Angles with the Sun's Bearing (he says) no Correction is then necessary. — He proceeds to a 4th, 5th, and 6th Question.

The Manner of exhibiting the Amsterdam Operation is explained by Remarks and Cautions farther on in the Nautical Ephemeris.

Mr. Emerson's Way of performing this Matter to good Effect may be seen in his Astronomy.

Remark. The Reduction of the 1st Altitude to an Altitude at the 2d Observation, is an Improvement upon perplexing the Seaman, like a tedious and incomprehensible Sermon, preached to an astonished Audience! And (begging the Improver's Pardon) giving the Sun's Altitude at the first, as it would be seen at the second Station, is interfering with, or taking away the Property of Interval between both Stations; by which, and the Sun's Difference of Declination, the Solution naturally and directly follows, to the Middle Time and Place of the Slip between both Stations, very nearly.

QUERE, *Whether a Nautical Ephemeris, published for a Year only before-hand, and Part of that Year expired, (with a future one promised shortly), supposing the Calculations to be near Truth, can answer the Navigator's Purpose, for a two or three Years Voyage?*

MR. EMERSON has demonstrated, in Prop. I. P. 127 of his *Mathematical Principles of Geography*, that if a Ship sails uniformly on the same Course, or *Rhumb*, with the Meridian, that she will uniformly approach the Pole in a finite Time, contrary to what is advanced by some pretending to Skill in Geometry, who maintain that she makes an infinite Spiral round the Pole, and never arrives there. *If which were true, any Thing continually and uniformly approaching the same Place at a finite Dist. could never reach it. The Absurdity of which is evident.*

To illustrate the Proof plainer and more strongly, Mr. Emerson shews, that if one Ship sails from any Place directly, on the Meridian, towards the Pole, with an uniform Velocity, equal to her constant Difference of Latitude, in a given Time, it cannot be denied but that she will reach the Pole, uniformly, in a finite Time; and if another Ship sets out from the same Place, at the same Time, and sails uniformly on a *Rhumb* towards the same Pole, at a Rate of Velocity, in her Distance sailed, constantly answerable to the former Ship's Difference of Lat. (for both Ships constantly to keep in the same Parallel of Latitude at the same Time) they must necessarily, after a finite Time, meet together at the same Instant, in the Place of the Pole. Since, as they both constantly keep in the same Parallel of Latitude, by Supposition, (see P. 129 of the said Book) they must arrive together, in the same Latitude with the Pole, or 90°, after a finite Time. Q. E. D.

PROMOTIONS dans les REGIONS de la LUNE.

1. LE grand Docteur en Card-Bills, communément connu sous le Nom de Monsieur de Case-Harden, de la Famille des Incendiaires de Dock-Yards, Ecrivain de Lettres sans Cachet, Secrétaire aux Chevaliers de la Poste-bleue, Membre de la nouvelle Société Catamite; élevé au Degré de Chevalier de Triangle et de la Corde, et Capitaine-Général des Forces de Newgate dans les Environs de Londres, Grand Maître de l'Epée de l'Injustice, et Gouverneur des Putains.

2. Monsieur de Brasi, de la Famille des Mail-Robbers, Macquerkers, Coupeurs, et Assassins, élevé à la Poste de Lieutenant-Général des Forces de Cheminée en St. Giles, Rue du Nouveau Londres dans la Lune; de la même Peice avec le Card-bill Docteur, et Frère Sterling du même Nid.

3. M. de Vitcbit, nouvellement élevé à l'Etat de grand Maître de la Société de la Longitude, Calculateur des Nativités, et Associé aux Messieurs de l'Art Né-cromantique: Deplus, élevé à la haute Dignité de grand Maître des Offices de Feu dans la Lune.

4. Madame Sophie de Vagtail, (avec des Jambes enflées, et des Nœuds aux Veines) autrefois élevée à l'Etat de Princesse Gouvernante de l'Ecole de Vénus, et Directrice des Pots de Chambre; mais nouvellement élevée à être la Directrice du Feu en général, et l'Eteignoir du même par l'Action de sa Machine d'Eau. Elle est aussi la Reine des Putains lunaires.

N. B. Le grand Card-bill Docteur [Hatton] de la Société Catamite, a perdu le Pucelage de sa Modestie à Genoux, quand il fut attaqué par l'impudent et invincible Pénétration de Monsieur de Brasi, au Temps qu'il fut initié dans les Mystères de la même Société, et depuis il a perdu toutes ses Facultés retentives.

The CHARACTER of an ATHEIST.

AN Atheist is an overgrown Libertine; and, if we believe his own Genealogy, he is a By-Blow, begot by Hazard, and flung into the World by Necessity. He moves by Wheels, and has no more Soul than a Windmill. He is thrust on by Fate, and acts by Compulsion. He is no more Master of his Deeds than his Being; and

and therefore is as constant to his *Word* as the *Wind* is to the same *Corner*. So that an *Atteist*, by his own Principles, is Knave *per se*, and an honest Man only *per Accidens*.

†† Mother Shipton's Fluxions, (like a Maggot among perfect Beings), inscribed to an eminent Lawyer, by Jack Jargon, to shew his Connexions, were received without Expence, but not *Gratis*. His first *traducing* and then *praising* the same Person; joined to his Principles and Disposition, gain him equal Credit and Esteem. Who in vain attempts to keep reputable Company.

REMARK. When the least Time and whole Numbers of Revolutions of a Number of Bodies meeting together are determined by the general Rule at P. 36, of this *Pal.* try what whole Number will divide those Revolutions, so as to leave the same fractional Part, besides whole Revolutions; divide the Time, answering to whole Revolutions, by that Number; then the Quotient of the Time will be the least fractional Time; and the Quotient of the Revolutions the least Revolutions and Parts when those Bodies will next meet.

Ex. If A, B, and C, travel round an Island in 2, 3, and 20 Days each, then $\frac{2}{1}, \frac{3}{1}, \frac{20}{1} = \frac{20}{10}, \frac{20}{4}, \frac{20}{1}$, with the same Numerator; shewing that A, B, and C, first meet in 20 Days, making 10, 4, and 1, Revolutions, respectively. Divide the Time and Revolutions by 3, and they will meet in 6 and 2-3ds least Days, making $3\frac{1}{3}, 1\frac{1}{3}, \frac{1}{3}$, least Revolutions and Parts. Hence Numbers may be so proposed that Bodies shall next meet in Parts of Revolutions.

☞ We are obliged to Quarter-Master Thorp for his Hints in the above Respect; who is a Proficient in useful Science, as well as in elegant Writing.

☞ Whoever sends the best Answers to the following Quere by the 1st of April next, shall be entitled by Lot, to 4, 3, and 2 Palladiums.

PRIZE-QUERE, by Chronologicus. Addressed to the Gentlemen executing the Office of Astronomer Royal.

REQUIRED the Distance of Time from the 0 Julian Year before (as set down in Mayer's Tables) to the Beginning of the 1st Julian Year since Christ. Also the Distance of Time, from the Beginning of the 0 Julian Year before Christ, to the Beginning of the 100th Year since Christ. Also what Year was the last Bissextile Year that next preceded the 1st Year of Christ.

THE 12 Mathematical Prize-Palladiums fell to Mr. Coughron. Three *Ænigma* Ditto to Mr. Sadler, 4 to *Ænigmaticus* of Richmond, and 5 to *Fidelia* of London. Two *Quere* Ditto to *Analiticus* of York, 3 to Mr. Hardy, and 4 to *Logarithmus* of Norwich, (for whose Answers we had not Room). Who are desired to send to Mr. Cole's for them, by an Order in their own Names and Hand-Writing.

** If any Persons want to complete their Sets of the Palladium, the following Numbers are left at Mr. Cole's, by a Contributor and Collector, who has been at much Pains in collecting them. To be sold for 2s. each Number. Sixteen Palladiums; viz. 1749; 2 of 1754; 1757; 1758; 1759; 3 of 1761; 2 of 1762; 2 of 1764; 2 of 1766; 1768. Mr. Steel, on Little Tower Hill, to be applied to for the last and present Year's Palladiums.

The following Diaries, left likewise at Mr. Cole's, to be sold at 1s. 6d. each. Ladies Diary, 1752; Gentleman's, 1761, 1762, and 1764.

☞ Any steady Person, of a Middle Age, well qualified to teach the Classics and the common Branches of Mathematics (especially Navigation), may earn something to his Advantage, by applying to Messrs. Baker and Galabin, at Number 19, in Cullum-street, Fenchurch-street: Directing his Letter Post-paid.

ERRATUM. In P. 41, L. 16, from the Bottom, for, when the *ce* Weight is, read, whence the Weight is.

T H E E N D.

